

# COMMERCIAL FISHERIES *Review*

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COVER: Fishermen tossing net over the side of a BCF research vessel.  
(Photo: Robert K. Brigham)

# COMMERCIAL FISHERIES

## *Review*

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.



Fishermen's Memorial  
Gloucester, Mass.

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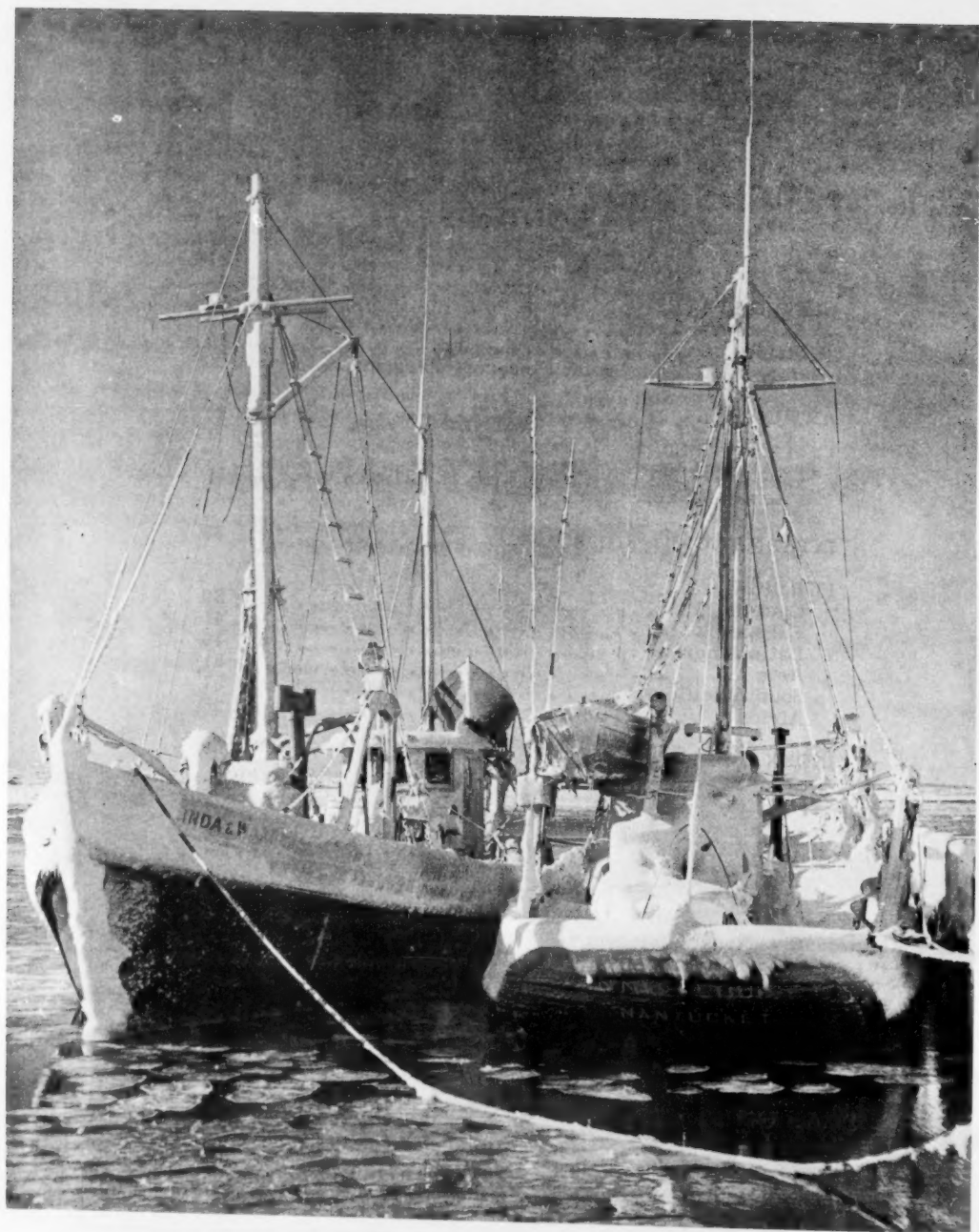


# 1968 PRODUCTION OUTLOOK IS NOT ENCOURAGING

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Nantucket fishing boats. (Photo: Robert K. Brigham)

## 1968 PRODUCTION OUTLOOK IS NOT ENCOURAGING

The 1968 production outlook for the U. S. fishing industry is not encouraging. Ground-fish abundance off New England is down--including haddock, cod, pollock, and flounder. Shrimp production, primarily in the Gulf of Mexico, is expected to be less than in 1967. Salmon production should improve over 1967, a particularly poor year, but may not reach 1965 and 1966 levels. The catches of Northern lobsters and sea scallops are not likely to increase much, if at all. Little change is ex-

pected in catches of crabs and oysters. Imports will continue to be the major source of edible fishery products in 1968--providing more than half the available supplies.

Prices will work up slowly during 1968. During the first quarter, retail prices for canned tuna and frozen shrimp are expected to be relatively favorable for consumers. Little increase is expected for these two items this year.



### THE 1967 STORY

Latest data, as of Jan. 22, 1968, indicate that supplies of edible fishery products in 1967 dropped about 3 percent--76 million pounds--below 1966. Imports did not increase as anticipated, although domestic production did drop, as expected. Besides the small run of salmon, there were disappointing catches of Northern lobsters, sea scallops, haddock, ocean perch, Atlantic coast flounders, and whiting; all contributed to the reduced domestic production.

Except for canned salmon, stocks at year's end were not unusually low, but they reflected the reduced supplies of many popular items. Cold-storage holdings of fillets of cod and haddock were below those of a year ago. Also lower were holdings of halibut, swordfish, whiting, spiny lobster tails, oysters, crabs and crab meat, scallops, and cured fish. On the plus side, frozen stocks of shrimp were sharply above those of a year ago. (BCF Branch of Current Economic Analysis.)



# UNITED STATES

## Friday Meat Hurts New England Fishermen

During the 9 months following the decree of the Roman Catholic Bishops of the United States abolishing meatless Fridays, the estimated average prices of New England fish were 12.5 percent lower than normal "after considering all other factors that affect fish demand." The loss to the New England industry was estimated at about \$3 million. "Although the short-run impact of the Church decrees has resulted in economic loss to the fishing industry, the long-run demand for fish remains uncertain."

This is reported by economist Frederick W. Bell in the December 1967 issue of "The New England Business Review" of the Federal Reserve Bank of Boston, Mass.

The fishing industry's problems were aggravated by smaller catches in early 1967, which depressed already-sagging revenues. To make matters worse, meat and poultry--chief competitors of fish--were plentiful in 1967 and their prices were dropping.

### Two Church Actions

In February 1966, Pope Paul VI decreed that Catholics no longer had to abstain from eating meat during Lenten weekdays, except on Fridays. (Lent is the 40 weekdays from Ash Wednesday to Easter.) Also, he empowered national conferences of bishops to end the ban on eating meat on Fridays during the rest of the year. In the United States, in November, the bishops announced that the ban would be lifted in December.

### Short-Run Effect

Bell states that the U. S. Northeast is an excellent area in which to assess the impact of the bishops' decree on fish consumption: much fresh fish is landed and distributed widely, and 45.1 percent of the population is Catholic, over twice the percent in any other region, according to the U. S. Department of Commerce.

To study the problem, 7 species of fish distributed to a large Catholic population were selected. These comprise about 72 percent by quantity and 79 percent by value of the catch landed in New England ports--excluding lobster, clams, oysters, and miscellaneous marine products. "It is unlikely that the latter are heavily tied to meatless Fridays." The species considered were:

Species	Principal Ports
Sea Scallops	New Bedford
Yellowtail flounder	New Bedford-Pt. Judith-Provincetown
Scrod (small haddock)	New Bedford-Boston-Gloucester
Large haddock	New Bedford-Boston-Gloucester
Cod	New Bedford-Boston-Gloucester
Ocean perch	Gloucester-Portland-Rockland
Whiting	Gloucester-Provincetown-Portland

Bell's study focused on 2 time periods: the 10 years before the decree, January 1957 to November 1966, and the period after the decree, December 1966 to August 1967. February and March were excluded because Catholics must not eat meat on Lenten Fridays.

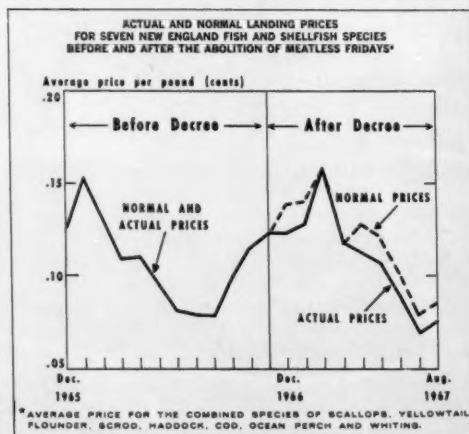


Table 1 - Impact of the Abolition of Meatless Friday on New England Landing Prices for Seven Fish and Shellfish Species (December 1966-August 1967)<sup>1/</sup>

Species	Actual Price Per Pound <sup>2/</sup>	Actual Revenue	Normal Price Per Pound <sup>4/</sup>	Normal Revenue <sup>5/</sup>	Decline in Revenue <sup>6/</sup>	Percent Change in Revenue and Price
	\$	\$1,000	\$	\$1,000	\$1,000	%
Sea scallops . . .	66.1	2,943	79.3	3,546	603	-17
Flounder . . . .	11.7	2,989	13.6	3,476	487	-14
Scrod . . . . .	11.3	4,228	11.5	4,314	86	-2
Haddock . . . .	13.6	2,512	17.4	3,180	668	-21
Cod . . . . .	8.9	1,949	9.9	2,166	217	-10
Perch . . . . .	4.1	1,859	4.4	2,020	161	-8
Whiting . . . . .	3.1	1,251	3.8	1,563	312	-20
Total (all species)	9.2	17,731	10.6	20,265	2,534	-12.5

<sup>1/</sup>Excludes February and March.

<sup>2/</sup>Yellowtail flounder.

<sup>3/</sup>Weighted average (weighted by quantity landed).

<sup>4/</sup>Normal price is determined by all demand factors which affect price, except bishops' decree.

<sup>5/</sup>Normal price multiplied by actual landings.

<sup>6/</sup>Normal revenue minus actual revenue.

Source: Federal Reserve Bank of Boston and BCF.

He reports: "After statistically controlling all demand factors that affect landing prices, the study showed that in the period after the bishops' decree prices were lower than normal for all seven species considered. Normal prices are defined as those resulting from all other demand factors except the bishops' decree."

His analysis discloses that landed prices of fish in New England averaged 12.5 percent lower than normal after the decree. The drop in monthly prices below normal ranged from about 21 percent for haddock to 2 percent for scrod.

For the 7 species, the fishing fleet lost about \$2.5 million from December 1966 to August 1967 (excluding February and March). Using the average price decline of the 7 to estimate the approximate price decline for the remaining New England species (excluding lobsters, clams, oysters, and others) indicates that the total loss may be over \$3 million for December-August. The economic loss is distributed among many communities; New Bedford is hardest hit.

Bell says his findings are consistent with those of other surveys. A recent one of suburban families in Chicago, Ill., found 35 percent eating less fish than before the decree. The Gallup poll in January 1967 revealed that 54 percent of the 45 million U.S. Catholics planned to eat meat on Friday.

As far as the effect of the Pope's decree permitting Catholics to eat meat during Lenten weekdays, except Fridays, Bell

believes more post-decree Lenten months must be studied before "the exact impact may be assessed."

#### Other Problems for Industry

From December 1966 to August 1967 landings of the 7 species dropped 23 percent under the figure for the year-earlier period. "Holding all other demand factors constant, the decline in landings produced a 16 percent decline in industry revenue or approximately \$4.4 million." Bell attributes the decline to rough weather in early 1967 and seasonal scarcity of fish in the Northwest Atlantic.

Table 2 - Change in Landings for the New England Fishing Industry (Period Following the Abolition of the Meatless Friday Compared with the Prior Period)

Species	Landings		Percent Change
	12/65-8/66	12/66-8/67 <sup>1/</sup>	
	. . . . (1,000 Lbs.) . . . .		%
Sea scallops . . . .	9,104	5,167	-43
Yellowtail flounder	50,041	34,979	-30
Scrod . . . . .	60,760	47,642	-22
Haddock . . . . .	30,517	22,206	-27
Cod . . . . .	20,896	23,959	+15
Ocean perch . . . .	62,326	53,791	-14
Whiting . . . . .	57,092	37,903	-34
Total (all species)	290,736	225,647	-22

<sup>1/</sup>Includes February and March.

Source: BCF.

The monthly index of meat and poultry prices averaged 4 percent below 1966's--resulting in a drop in fish prices of about 5 percent. This produced a loss of \$1.5 million in December 1966-August 1967 for the 7 species. "Although the decline in landings and the fall in meat and poultry prices may be



just temporary, they have served to aggravate the impact of the bishops' decree.

#### Long-Run Effects are Uncertain

Bell believes it is too early to assess the long-run reactions of Catholics to the church changes--"perhaps, 18 to 24 months will be necessary." To do this, answers would have to be obtained for several important questions:

1. Did Catholics eat more fish than non-Catholics before the decree? Non-Catholic demand for fish may be considered "normal"--"without artificial inducements." If Catholics ate more fish than other groups before the decree, this extra consumption might have vanished after the decree and produced Bell's findings.

2. Catholics may have eaten the same amount of fish as non-Catholics--but reduced consumption for a short period with their new freedom. If this is what happened, "it might imply long-run optimism for the industry since Catholics may, after a time, return to 'normal' fish eating habits of non-Catholics."

3. There is a possibility, less pleasant for the industry, that "both Catholic and non-Catholic demand was artificially created by the institution of meatless Fridays." Many restaurants and institutions served fish on Friday and that may have induced non-Catholics to eat more fish than usual.



### 1967 New England Landings Dropped Sharply

New England food fish landings in 1967 were 354 million pounds--down 78 million pounds from the 432 million of 1966. Industrial fish landings were 73.7 million pounds, compared to 77.2 in 1966.

Landings at Boston Fish Pier were 77 million pounds; in 1966, they were 89 million. The big drop was in scrod haddock--33 million, compared with 48 million in 1966. Average exvessel price for all fish landed in Boston--12.11 cents a pound--was only slightly above 1966.



### Washington State Water Standards Approved

Secretary of the Interior Stewart L. Udall has approved the water quality standards adopted by the State of Washington to protect and improve the quality of its hundreds of miles of interstate and coastal waters. The standards provide that existing water quality will be retained or improved.

Under the Water Quality Act of 1965, the States were given the opportunity to establish standards to enhance the quality of their interstate and coastal waters, subject to approval by the Interior Secretary.

Washington joined 10 other States whose standards have been approved in whole or in part.

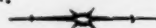
The Washington standards provide for multiple use of interstate and coastal waters, including swimming, boating, oyster harvesting, and salmon migration. All these waters will be made suitable for swimming, except the 3 industrial harbor areas of Seattle, Everett, and Bellingham. The standards include a time schedule for building a secondary-treatment facility for all domestic, commercial, and industrial wastes discharged to fresh water streams by 1972.

#### Thermal Effects

Secretary Udall noted that a recently started two-year study of the effects of raising water temperature by power plants and other operations in the Columbia River Basin should help to resolve the differing limitations imposed by Washington and neighboring Oregon on the allowable change in water temperature. The study is being made by officials of Washington and Oregon, Interior's Federal Water Pollution Control Administration, and the Atomic Energy Commission. Temperature changes in streams, and their effects on fish and other aquatic life, are a concern of Interior Department.

Water quality standards have been approved in whole or in part by: Oregon, except for a small part including the Klamath River and Goose Lake drainage areas; Georgia, New York, Indiana, South Dakota, Arkansas; Idaho, except for Bear River Basin; Maryland, Massachusetts, and North Dakota, except for Red River of the North.

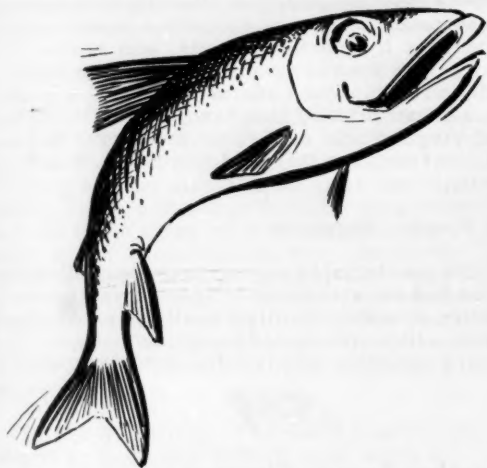
Standards submitted by the remaining States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, and the Virgin Islands are being reviewed.



## Lake Trout Are Back in the Swim

The lake trout of Lake Superior, driven close to extinction by the fierce attacks of the eel-like sealampreys, have been rescued by--man. In 1967, the lake trout were more abundant than at any time in nearly 30 years; they had increased over one-third in just one year. And only 2 percent of the trout examined showed the wounds of the lifesucking lampreys.

The lampreys first made their way into the Great Lakes in the 1940s--and came close to annihilating the lake trout of Lakes Michigan, Superior, and Huron.



### Counterattack

In 1958, scientists of BCF and the Canadian Government launched a 2-fold lamprey-control program, which was administered by the Great Lakes Fishery Commission. A "lampricide," a chemical developed by BCF scientists to kill only the larvae and young of lampreys, was spread through the parts of streams in which lampreys spawn.

And, to fill the ravaged ranks of the lake trout, vast quantities of juveniles were put into the affected lake areas.

By 1961, in Lake Superior, the tide of battle began to turn. Since then, the lake trout

have increased steadily--and the lampreys have declined steadily.

### Many Streams Treated

After Lake Superior, and by the end of 1966, all lamprey-infested streams entering Lake Michigan were treated. Hatchery-reared trout fingerlings were first put into the lake in 1965 and have grown well.

To aid Lake Huron's trout, lampricide treatment has begun of infested streams in the U. S. and Canada that flow into the lake.

Overall, the lampricide has been used on more than 250 infested streams that make their way into the Great Lakes.



### Lamprey Control May Cut Alewives Too

Lamprey control also may aid in the campaign against the unusually abundant herring-like alewife that was a great nuisance to Lake Michigan communities in 1967. Alewives died in great numbers. They were expensive to haul away, forced out some private owners, and hurt the tourist trade. Now, with fewer lampreys present, fewer lake trout and coho salmon will be killed by them. So more of the salmon now being planted will survive--and eat more alewives.

### Millions of Lake Trout Planted

In 1967, 5½ million lake trout were planted in Lakes Superior and Michigan by Ontario



Province, the States, and the Bureau of Sport Fisheries and Wildlife. All in all, about 24 million hatchery-produced trout have been introduced into those lakes since the program started.

### Salmon Thriving

In 1966 and 1967, Michigan put almost 4 million coho and chinook salmon into Lakes Superior and Michigan. In 1967, fishermen caught 31,000 coho, most over 11 pounds, in Lake Michigan. About 15,000 smaller cohos were caught in Lake Superior.

### "Splake" May Make Splash

Canada has had good results from a 5-year experiment with "splake," a lake trout-brook trout mixture. She is considering introducing it into Lake Huron in 1969-70.



### Coho Salmon Will Be Introduced Into Lake Erie

Officials of U. S. and Canadian conservation agencies met in December 1967 to coordinate efforts to introduce coho salmon into Lake Erie. They proposed a limited first planting until the introduction could be evaluated. They suggested studies of coho competition with other species--and marking of coho so their place of origin would be known when captured. They recommended that the Lake Erie Committee of the Great Lakes Fishery Commission serve as coordinating agency; also, that the Commission act as clearinghouse for information on the program, and assign tagging marks to agencies.

The officials represented the Province of Ontario, the States bordering Lake Erie, Bureau of Commercial Fisheries, Bureau of Sport Fisheries and Wildlife, and the Commission.

### States to Introduce Coho

In spring 1968, Pennsylvania proposes to introduce 100,000 coho fingerlings, Ohio 25,000, and New York may plant some.



### Three States Seek to Standardize Crab-Meat Pasteurization

Representatives from Maryland, North Carolina, and Virginia met at the Virginia Institute of Marine Science, Gloucester Point, Va., recently to discuss pasteurization of crab meat. The group included seafood processing specialists, members of State health departments, seafood packers and marketers, and researchers.

### Larger Market Possible

It is generally agreed that the industry will benefit from marketing larger quantities of pasteurized crab meat because this improves keeping qualities. Pasteurized crab meat could be bought in more economical quantities by markets, hotels, and restaurants--and possibly could find markets outside the U. S. The Federal Statistical Digest shows that in 1965, Maryland, North Carolina and Virginia sold crab meat worth over \$13 million--besides that sold canned or as soft crabs.

### To Propose Standards

The participants agreed to prepare directives and set standards for pasteurization to assure a uniformly high-quality product. These will be presented to crab-meat processors and State officials for consideration.



### Weather Bureau Changes Coastal Warning Terms

The WHOLE GALE warning used in weather forecasts for marine interests along the coasts and on the Great Lakes will be changed to STORM warning, effective March 1, 1968, according to Dr. George P. Cressman, Director of the U. S. Weather Bureau. The term STORM also will be applied to the flag-and-light signals formerly called WHOLE GALE signals, which are displayed at coastal locations.

STORM warnings and displays will indicate that winds of 48 knots (55 miles an hour) or more are expected.

HURRICANE WARNINGS will be issued to mariners and displayed as signals only when

storms of tropical origin are expected to cause winds of 64 knots (74 miles an hour) or more. When there is no tropical storm, a STORM warning will indicate forecast winds of any velocity over 47 knots.

These changes will make Weather Bureau terminology conform to that used internationally.

Now, the warnings and display signals will be:

**SMALL CRAFT WARNING:** One RED pennant displayed by day--and a RED light over a WHITE light at night--to indicate winds up to 33 knots (38 miles an hour) and/or sea conditions considered dangerous to small craft are forecast for the area.

**IMPORTANT!** The Small Craft Warning covers a wide range of wind speeds and/or sea conditions. Also, "small craft" include boats of many designs and sizes. Therefore, mariners should regard the Small Craft Warning display signal as an alert that wind and/or sea conditions potentially dangerous to their boats exist, or are forecast. For more specific information, they should obtain a detailed forecast by telephone--or listen to coastal weather forecasts and warnings over local radio stations, Coast Guard radio, or the Weather Bureau's continuous VHF/FM broadcasts on 162.55 megahertz where available.

**GALE WARNING:** Two RED pennants displayed by day and a WHITE light above a RED light at night to indicate winds within 34 to 47 knots (39 to 54 miles an hour) are forecast for the area.

**STORM WARNING:** A single square RED flag with a BLACK center displayed by day, and two RED lights at night, to indicate that winds 48 knots (55 miles an hour) and above, no matter how high the velocity, are forecast for the area.

**IMPORTANT!** If the winds are associated with a tropical cyclone (hurricane), the "Storm Warning" display indicates forecast winds of 48 to 63 knots (55 to 73 miles an hour).

**HURRICANE WARNING:** Displayed only in connection with a tropical cyclone (hurricane). Two square RED flags with BLACK centers displayed by day, and a WHITE light

between two RED lights at night, to indicate that winds 64 knots (74 miles an hour) and above are forecast for the area.



## EDA Approves BCF Fish-Farming Proposal

The Economic Development Administration (EDA) will provide BCF with \$149,300 in technical assistance funds to help pay for an assistance program to the fish-farming industry in 9 South Central States. BCF will contribute \$73,700 and provide research and information on harvesting, processing, and marketing catfish.

### 9 States Will Benefit

The project will cover the fish-farming areas of Arkansas, Alabama, Georgia, Illinois, Kansas, Missouri, Mississippi, Oklahoma, and Texas.

In recent years, growing catfish in ponds has been a profitable way of developing farm operations. From a few thousand pounds in 1963, production increased to estimated 15,000,000 pounds in 1965.



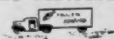
## ICC Blocks Reduction in Fresh-Fish Market Area

On Dec. 28, 1967, the Interstate Commerce Commission (ICC) overruled one of its examiners who had sought to reduce the area served by the Railway Express Agency (REA). At present, much fresh fish is distributed direct to restaurants and retailers by REA because it has a wider distribution area than motor carriers at each metropolitan terminal. Motor carriers are restricted to a smaller commercial delivery zone.

### Examiner's Ruling Overturned

The ICC examiner had ruled that REA areas be cut to the sizes of motor carriers delivery limits. The action by the entire ICC maintains the present system.

The Secretary of the Interior supported REA on behalf of the U. S. fishing industry to continue the wide distribution of fresh fish.



## Customs Bureau Studies U. S. Imports of Canadian Cod Fillets

A notice was published by the U. S. Bureau of Customs in the "Federal Register," Jan. 5, 1968, stating that there are reasonable grounds to believe or suspect that the purchase price and exporter's sales price of cod fillets, frozen, from Eastern Canadian provinces is less than foreign market value. This value is defined in Antidumping Act of 1921, as amended.

Customs officers have been directed by the Commissioner of Customs to withhold appraisals of such frozen codfish until it is determined whether it is being sold at less than fair value. Retroactive antidumping duties cannot be assessed on imports that have been appraised.



## Import Regulations on Salmonid Fish Species or Eggs Amended

New regulations, effective July 1, 1968, covering import of certain harmful birds and fish species or fish eggs that may shelter diseases were announced Dec. 31, 1967,

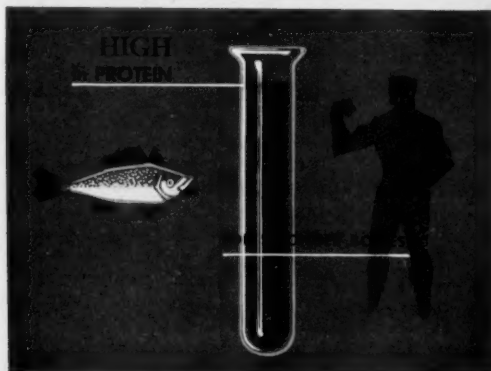
by Interior Department's Bureau of Sport Fisheries and Wildlife (BSFW). They were published in the "Federal Register," Dec. 21, 1967.

Section 13.7 of the regulations is entitled, "Importation of live or dead fish, mollusks, and crustaceans or their eggs." It requires that imports of live or dead fish of the family Salmonidae be certified free of viral hemorrhagic septicemia and myxosoma cerebralis, the organism causing "whirling disease" of trout. The diseases have brought heavy losses to trout hatcheries in Europe. These diseases pose no threat to human health.

### Exceptions

There are exceptions to the certification requirement: (1) salmon landed in North America and brought into the U. S. for processing or sale; (2) any salmonid caught in the wild in North America under a sport or commercial fishing license; (3) salmonid fish species or eggs that have been canned, pickled, smoked, or otherwise prepared which destroys the 2 diseases.

The fish-import prohibition was set after talks with the Canadian Wildlife Service.



## OCEANOGRAPHY

### Manpower Is 'Vital Ingredient' of Marine Sciences, Says Wenk

More progress was made in the marine sciences in the 1960s than during the preceding 100 years, but the "really crucial decade" will be the 1970s. And manpower is the "vital ingredient" of the marine sciences. So said Dr. Edward Wenk Jr., Executive Secretary, National Council on Marine Resources and Engineering Development, to the Symposium on Manpower for Oceanography in Houston, Texas, Nov. 20, 1967.

The oceans have had a profound influence on U. S. economic and political development, Dr. Wenk continued. Despite the Nation's "ocean-oriented beginnings, our natural awareness of the importance of the sea waxed and waned. Our indifference to the sea has been reflected in many ways. Although we achieved some notable firsts with charts of the tides, currents, winds, and shoals, our study of the ocean has lagged behind most of our other scientific pursuits."

#### Congress Helped

In 1966, the 89th Congress enacted the Marine Resources and Engineering Development Act. It became U. S. policy, for the first time in history, "to develop, encourage, and maintain a coordinated, comprehensive, and long-range program in marine science for the benefit of mankind." Dr. Wenk explained: "Congress was no longer thinking in terms of narrow scientific disciplines, but in terms of the social purposes to which science and technology might be directed."

Discussing the challenge of the sea, Vice President Humphrey, chairman of the National Council on Marine Resources and Engineering Development, said the sea may contribute to the solution of the following great human problems:

- "There are one and one-half billion hungry people in the world. The full food potential of the seas, seriously neglected in the past, must be realized to combat famine and despair....

- "Seventy-five percent of our population lives along our coasts and Great Lakes... (yet) only three percent of our ocean and

Great Lakes coastline has been set aside for public use or conservation....

- "The continuing threats to world peace require our Navy to maintain a high level of readiness and versatility through a sea-based deterrent and undersea warfare capability....

- "Thirty million Americans swim in the oceans, 11 million are salt-water sport fishermen, and 8 million engage in recreational boating in our coast States, yet industrial wastes being dumped into the ocean tributaries will increase 7-fold by the year 2000 unless there are drastic changes in waste handling.

- "Ocean-generated storms cause millions of dollars of damage annually along our coasts, but marine weather warning services are available to less than one-third of our coastal areas."

Dr. Wenk noted that as population grows, the demands for energy will keep pace. Off-shore oil and gas will grow in importance in 1970s and beyond.

#### Range of Marine Science Activities

The marine sciences encompass many activities, Wenk listed: "national security; fisheries development and seafood technology; transportation; recreation; pollution abatement and control; international cooperation; marine minerals, chemicals, and energy resources; health; shore and harbor engineering; weather prediction and control; and the romance of pure science, too. Underlying and cutting across those functions are basic oceanographic research, mapping, ocean observation and prediction, general purpose engineering, data collection and analysis, and specialized education."

Occasionally, crises will focus attention on these activities, Wenk noted, "but in the absence of a crisis, how can we unite the ocean sciences and public policy?" The Marine Resources and Engineering Development Act of 1966 assigned leadership to the President and set up the Marine Sciences Council to help him. No objective of U. S. marine science activities is more important than one included in the Act: "The effective utilization of the scientific and engineering resources of the Nation, with close





Fig. 1 - Measuring a sample of the catch. Size of fish concerns both scientist and fisherman. (Photo: "Seattle Times")

cooperation among all interested agencies, public and private, in order to avoid unnecessary duplication of effort, facilities, and equipment waste."

#### Marine Sciences Manpower Today

Dr. Wenk affirmed: "In the United States today our oceanographic research ranks with the world's best. Our scientists rank with the world's finest. Other nations have small numbers of extremely competent scientists, but only the USSR can be compared to the United States for the extent and quality of its research capability."

This situation portrays to Dr. Wenk "a most evident truth," first of 4 points he made at the symposium:

#### I

"Manpower is the vital ingredient of the marine sciences."

In the past 6 or 7 years, the U. S. "sharply increased its investment in training, education, and facilities in oceanography as in the

other natural sciences. The results are becoming evident.

Oceanographic Degrees		
Year	Enrollment	Ph. D. Degrees Granted
1961	105	9
1963	188	8
1965	520 (est.)	25
1967	980 (est.)	60 (min.)

From 1957-1963, financial support quintupled. "That almost explosive growth" was made possible because "a core of newly trained professionals" had emerged. It had become possible to attract into ocean research,



Fig. 2 - Job Corps trainees from Wellfleet, Mass., join BCF's "Albatross IV" for demonstration cruise. Ship's staff explained equipment. Biologists of BCF's Woods Hole Laboratory demonstrated scientific gear in electronic rooms and labs. A fishing tow was set. Group watches cod end being lowered into sorting box. (Photos 2-4: Robert K. Brigham)



Fig. 3 - Albatross IV's 2nd mate, Robert Grant, explains wheel-house equipment to Job Corpemen.

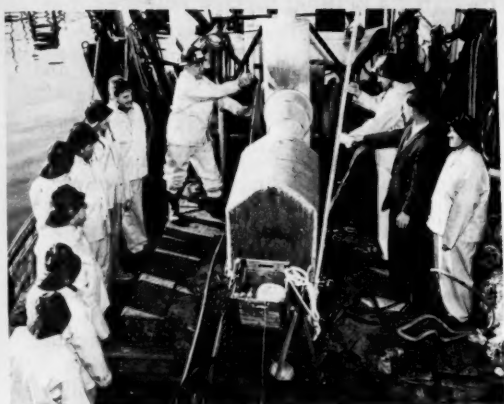


Fig. 4 - J. J. Murray (wearing USDI helmet), a BCF Safety Officer, shows trainees in on-the-job classroom safety precautions to follow while spooling trawling cables onto trawl winch drums.

Program is sponsored by New Bedford (Mass.) Fishermen's Union and local Seafood Producers Assoc. under U. S. Labor Department's Manpower Training and Development Act. It provides valuable instruction in commercial fishing to youths interested in making it their livelihood.

Program includes on-the-job experience aboard vessels and on-shore instruction in net mending, navigation, and engine and deck equipment and repair. As a result, 61 new fishermen have been added to New England fishing fleet.

competent men trained in other disciplines. More and better-equipped research ships and specialized laboratories became available.

Dr. Wenk emphasized: "Manpower is the vital ingredient in the marine sciences, and not just in terms of numbers. We need diversity and quality as well as quantities of people. We need intellectual as well as statistical support. We need to take a head-count even more than we need to take a nose-count."

## II

"When we consider the variety of marine science activities, we realize the different kinds and combinations of manpower involved."

Oceanography involves every field of science and every field of engineering, economics, law, public administration, foreign affairs--and institutions, the U. S. Government and all governments, States, industries, and universities. When Congress established this program, it "thought in terms of large

social purposes. And in implementing the legislation, we are aggressively seeking ways and means of linking the oceans to the needs and aspirations of people." However, there is a danger in "arbitrary linkages," and the "essential core of science" must not be overlooked.

Dr. Wenk emphasized: "In my view, the best way of guarding against that hazard is by maintaining a creative, vigorous, and growing foundation of basic research and education. We must do everything possible to attract the best young minds to this field recognizing that we are in competition with others offering glamour and challenge."

## Sea-Grant Program

Dr. Wenk pointed to the value of the Sea-Grant concept, part of the Marine Sciences Program, which includes many disciplines, including law and economics. Its philosophy is that "it is the collaborative effort of all these skills that gives the marine enterprise its strength." The program is being conducted in the universities--"with continuous interaction among the Federal Government, the schools, and industry to examine common problems and to pool diversified resources, facilities, and specialized talents for their solution."

The Sea-Grant program "recognizes that we need people with different levels of training--technicians, practitioners with B.S. degrees only, master's degree professionals, Ph.D.'s, and those with postdoctoral education. It recognizes that we need great varieties of specialists and generalists, from the sciences, the social sciences, the humanities, and other fields. And it recognizes that we must have people who can think horizontally as well as vertically."

Dr. Wenk made clear: "I believe in the multidisciplinary approach, for it is the only way to make progress in today's complex society using today's complex technologies." But he cautioned against a development that was the third major point he made at the symposium:

## III

"We cannot let the complexity of requirements for either manpower or technologies obscure the core of oceanography."

The multidisciplinary approach does not imply that "oceanographers will be superseded

by general scientists, jacks-of-all-trade." Dr. Wenk quoted from "Effective Use of the Sea," the report of the President's Science Advisory Committee. It recognized the oceanographer's role: "From these individual scientists come most of the ideas which are translated into questions about the oceans, which, in turn, motivate larger, organized data-collecting projects... Our reason for mentioning the role of these individuals is to emphasize how essential they are and to insure that this effort is not overlooked in the hurly-burly of larger plans."

Dr. Wenk emphasized that the oceanographer, far from being obsolete, was "at the core of the marine sciences effort of the present and the future. The only concern I have about his role is that I want to see it strengthened."

#### IV

"While more progress has been made in the marine sciences in the 1960s than in the preceding 100 years, the really crucial decade will be the 1970s."

Dr. Wenk asked the members of his audience what contributions they, their institutions, and their professions were prepared to make over the next 10 years to meet such problems as: "feeding the world's hungry masses with food from the sea; preserving the quality of the coastal zone; strengthening international cooperation; enhancing safety at sea; rehabilitating our harbors and cities; recovering the minerals from the continental shelf and the deep oceans; exploring the oceans, observing and predicting the atmosphere, and controlling the weather; basic and applied research as well as engineering relating to the marine sciences; and educating those who would do such jobs."

#### 3 Critical Manpower Needs

When oceanography was young, Dr. Wenk said, there were no scientists with specialized training. Its rapid growth was made possible by bringing in people with training in one of the more basic sciences. Teachers of oceanography agree that "the prime requisite is a sound foundation in basic science... specialized formal study is not a requisite for a competent oceanographer" and it is desirable to attract people from other disciplines at the postdoctoral level.

He listed 3 critical marine sciences manpower needs:

1. "We must maintain the momentum and increase the level of support for the scientific study of the sea, with related education."

He said the Marine Sciences Council is examining multi-year support and ways of increasing and funding long-range ship operations. "We expect the Federal role to continue to be one of leadership, planning, and assistance to all sectors involved in marine sciences activities." But the private sector must be intimately involved in its traditional role of developing resources. "They have a need for specialized manpower and thus a responsibility to share in training through fellowships and research grants."

To maintain the momentum, oceanography needs an improved status and more money within institutional boundaries and budgets. Schools should consider training foreign students in the marine sciences.

2. The second critical priority need is to intensify the training of engineers. "Ocean engineering integrates many existing engineering and scientific disciplines and applies them to the ocean environment. The field is

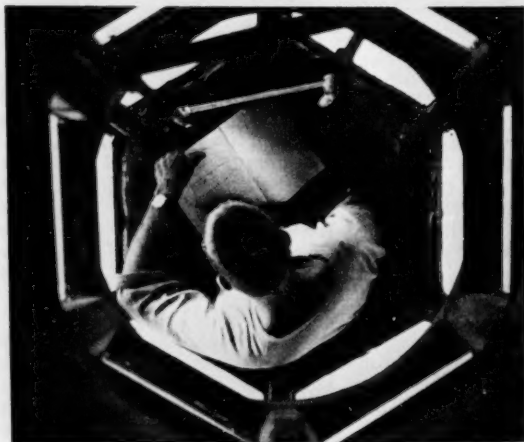


Fig. 5 - Vehicle to study ocean's upper layers. Biologist Reginald Gooding in observation chamber of raft "Nenu" of BCF's Biological Laboratory in Honolulu.

Gooding designed and built it to study fishes that accumulate under floating objects at sea. View chamber extends 7 ft. under water. In cramped quarters, biologists view and photograph many creatures.

(Photo: J. J. Magnuson)



similar in scope and concept to aeronautical and astronautical engineering, which are directed toward and controlled by the environment in the atmosphere and outer space."

At the Massachusetts Institute of Technology, ocean engineering "emphasizes the principles governing the systems for the exploration and utilization of ocean resources, the conduct of oceanographic research, and the recovery of objects from the ocean floor." It includes special surface vehicles, submerged vehicles, stationary floating platforms and structures, support of ocean mining and oil drilling, and other subjects.

3. "The third critical priority need is to train technicians who can assist both the scientist and the engineer aboard ship, in the laboratory, in the marshlands, or wherever the oceanographer or ocean engineer's work takes him and the marine sciences team."

This team will need many disciplines, levels of competence, and training. Scientists and engineers will be able "to switch from land-based, non-ocean-oriented activities with relative ease," if universities have refresher courses, or training is available somewhere else.

Education and training will be necessary. Junior colleges and technical schools have been increasing and they can be adapted easily to meet the needs for technicians. "Our colleges, universities, and oceanographic institutions have but to mesh their programs with those of nearby junior colleges--found now in all 50 States--to provide a total educational system adapted to the needs of the marine sciences and society in the 1970s."

A source of manpower is the economically deprived. "They share the problems of the seas but not the benefits. They inhabit the waterfront slums and work at the most menial jobs on the docks. What I am suggesting is that we move towards solving this shortage of technicians by carrying the story of oceanography to minority groups who would be attracted to these opportunities. Then let us make certain that we train and promote them as rapidly as their progress permits."



## "Discoverer" Seeks Clues to Origin of Continents

During February and March, the U. S. Coast and Geodetic Survey ship *Discoverer* will be seeking evidence that Africa might once have been connected to North America in one supercontinent. The *Discoverer* sister ship of the "Oceanographer," is conducting a 3-month, 20,000-mile expedition to gather information from the depths of the South Atlantic off the west coast of Africa.

The *Discoverer*'s survey off west Africa is along the 1,200-mile edge of the continent between Dakar and Abidjan. Subbottom penetration soundings are being made along the 1,000-fathom (6,000-foot) isobath or contour line. A seismic reflection profiler is used to detect the geologic structure below the sea bottom.

"The purpose is to try to match the continents at a point halfway between the surface of the continents and the deep sea. The 2½-mile-high continental slopes, which connect the continental shelves with the deep-sea floor, are the true geologic boundaries of the continents."

### 1 vs. 2 Supercontinents

If the concept of one supercontinent is correct, then the *Discoverer* should find evidence linking Africa to North America. The bulge of Africa around Dakar would fit, jigsaw-puzzle style, into the southeastern U. S.--from about Cape Hatteras, N.C., to Florida, and then outside the Bahama Islands.

But if the survey produces evidence that the area around Abidjan fits against northeastern Brazil off the Amazon River, it would tend to support the 2-continent theory.

In 1967, the *Oceanographer* made similar surveys along the east coast of South America and off Australia.



## Foreign Fishing Off U. S. in December 1967

### IN NORTHWEST ATLANTIC

Nineteen fishing vessels from Poland, East and West Germany, and the Soviet Union fished in the Northwest Atlantic off southern New England, New York, and the New Jersey coasts in December 1967; 46 were sighted in November 1967. No foreign fishing vessels were reported off the east coast during December 1966.

Weekly sightings showed sharp decline from 16 vessels in first week of December to a scattered few by year's end.

**Soviet:** For the third consecutive month, there were only 5 or 6 factory stern trawlers and an occasional supply ship--scattered widely along southern New England areas and off Long Island, N. Y. At times, these vessels fished only 15 miles from Long Island.

Although her vessels were usually observed actively fishing, no catches were observed. Over the past several months, these vessels were presumed engaged in exploratory fishing. Late in the month, one factory stern trawler was reported fishing off Virginia. The catch was believed to be red hake and whiting.

In December 1966, no Soviet vessels were sighted off east coast.

**Polish:** The sizable fleet deployed on Georges Bank and off southern New England since mid-1967 shifted its attention at end of November to fishing grounds off eastern Nova Scotia and Newfoundland. Two vessels fished briefly south of Block Island, R. I., early in December.

**East German:** One freezer stern trawler was observed fishing among other vessels south of Long Island. It was reported off New Jersey among West German vessels in late December.

**West German:** Early in December, 8 freezer stern trawlers were sighted in a 15-mile area 15 to 30 miles south and southwest of Montauk Point, L. I. Trawls containing huge catches of fish, believed herring, were observed on board.

By mid-month, a New Jersey sport fishing boat operator reported that 7 West German stern trawlers were fishing 20 to 30 miles southeast of Manasquan Inlet, New Jersey. They were presumed fishing for herring.

### IN GULF OF MEXICO

No foreign fishing vessels were sighted off U. S. during November.

### OFF CALIFORNIA

**Soviet:** 18 vessels were sighted during December. Most were large stern factory trawlers (13 units); but 1 medium freezer trawler, 2 fishery research vessels, 1 refrigerated fish transport, and a passenger ship also were sighted.

Only 2 of the 18 stayed the entire month; the rest only a week or two at different times. From 5 vessels sighted in first week, fleet increased to 12 by mid-month, then decreased to 3 during last 2 weeks.

The vessels moved all month--indicating Soviet fisheries there are not yet firmly established.

In first week, Soviets fished off Crescent City in northern California with 6 stern factory trawlers. By mid-month, a few of these had gone as far as San Nicolas Island off San Francisco. From there, some might have gone further south towards Mexico. By month's end, only 2 trawlers were fishing off northern California.

During second week, most Soviet fishing was off San Francisco and near Santa Barbara Island in southern California. At least 8 stern trawlers were sighted off San Francisco: 5 fishing, the others apparently in transit southward. Those off Santa Barbara were a modern 6,300-gross-ton refrigerated fish carrier (the "Sibir") receiving frozen catch packed in paperboard boxes from 2 large stern trawlers. After unloading, all 3 vessels went north.

During second-half December, only 2 stern trawlers fished off northern California; 2 others were in transit.

Although 2 research vessels were seen for short periods off California, it is unlikely that much research was done. The flagship of the Pacific Institute for Fisheries and Oceanography, "Akademik Berg," was sighted 18 miles

southeast of San Nicholas Island (about 40 miles southwest of Los Angeles) on December 5. Apparently, she was on her way to explore for new commercial stocks in the South Pacific off New Zealand and Australia. The "Ogon," which had spearheaded fishery research in the northeastern Pacific, entered San Francisco Bay on December 18 for emergency medical treatment of a crew member. The vessel waited until his discharge from the hospital just before Christmas.

No violations of U. S. 12-mile contiguous fishing zone were reported, but on 4 occasions Soviet vessels fished just beyond zone (from 12-13 miles off U. S. shore).

No information on species caught is available. Only once was Soviet catch identified: one stern factory trawler was catching "red and black" bottomfish about 12 miles off Crescent City.

The pattern of Soviet fishing in December 1967 was similar to that of December 1966, with one exception: the vessels sighted had doubled. If past experience can indicate future trends, these developments in Soviet fisheries off California may be expected: From January through March 1968, fewer than 10 vessels will operate off California. Some will fish, others will conduct exploratory commercial fishing, and many will transit to and from South Pacific fishing grounds. By April 1968, the fleet will at least double and remain at that level until Pacific hake fishing starts off the Pacific Northwest. From then on, Soviet fisheries off California will fluctuate, depending on success of hake and ocean perch fisheries to the north.

The scattered information available on Soviet fishing off California again indicates that only part of the fleet is sighted by surveillance patrols. During 1967, an average of about 5 was sighted weekly. The actual number was perhaps 2 or 3 times that figure.

Japanese: In mid-December, a 500-gross-ton seiner left Japan to fish bluefin and yellowfin tuna in the eastern Pacific Ocean. The vessels plan to fish "off the California coast" until about March 1968, then to proceed southward to waters off Mexico and central America. About June, it will enter the tuna fishery in the Atlantic Ocean off Africa. By the end of December 1967, this vessel had not been sighted off the U. S. coast.

## OFF PACIFIC NORTHWEST

Soviet: Bad weather and poor visibility made surveillance of foreign fishing off Washington and Oregon difficult in early and late December. The vessels sighted decreased rapidly in late November and first week of December--from about 35 to fewer than 10. All were fishing vessels, mostly large stern factory trawlers. No processing vessels were sighted, an indication that catches were not too good. Some stern trawlers, however, had their reduction plants operating, indicating production of fish meal. The number of vessels sighted was somewhat larger than in December 1966.

Soviet vessels operated off Oregon during first-half December; during second part, they were sighted mostly off Washington. By December's end, only 2 stern trawlers were fishing about 15 miles west of Destruction Island, Washington.

No information is available on the species caught.

One research vessel (the Ogon) was sighted conducting undetermined research; late in month she was off San Francisco for the emergency medical evacuation.

Japanese: 2 stern trawlers and 1 support vessel were reported operating at various times and points off Washington and Oregon, and northward off southern British Columbia. It is believed these vessels were taking hake and Pacific ocean perch.

## OFF ALASKA

Soviet: The number increased steadily from 20 in early December to about 70 vessels in late December. The main reason was the discontinuation of fisheries off Pacific Northwest.

The Pacific ocean perch fishery in Gulf of Alaska was conducted by 8-15 vessels. Three stern factory trawlers and one medium trawler fished off southeast Alaska. One stern factory trawler operated on Yakutat grounds and another fished Portlock Bank area. At least 3 stern trawlers fished on Albatross Bank (east of Chirikof Island). During first week, 6 stern factory trawlers fished for perch along central Aleutians and apparently stopped in mid-December.

The deep-water trawl fishery, between 600 and 900 meters, was resumed north of Fox Islands in early December by 5 medium freezer trawlers; by month's end, 3 more freezer trawlers joined fishery, mainly sablefish and turbot.

The winter flounder fishery began in early December, when 8 trawlers appeared on traditional grounds in eastern Bering Sea, about 45 miles north of Unimak Island. By month's end, the fleet numbered about 50.

Japanese: Fishing effort increased from fewer than 10 vessels during first week to about 45 ships by month's end.

The number of factory trawlers fishing Pacific ocean perch in Gulf of Alaska varied from 2 early in month to 4 by end. One trawler fished along 100-fathom curve between Yakutat grounds and Portlock Bank early in December. During same period, a second operated off southeast Alaska near Cape

Ommaney. During last week, a smaller stern trawler entered Kodiak for medical assistance, and then resumed fishing in Gulf of Alaska. The 4th factory trawler was scheduled to depart Japan prior to Christmas to resume perch fishing in Gulf.

Two factory ships, accompanied by about 16 trawlers and 2 reefers, began "winter trawl fishery" for Alaska pollock in early December in eastern Bering Sea north of Fox Islands. One fleet will fish primarily for Alaska pollock to produce minced meat. In late December, 2 more fish meal and oil factory ships, with 18 trawlers, joined trawl fishery. These 2 fleets are producing fish meal and oil; they are using primarily flatfishes and Alaska pollock.

Two long-liners continued to fish for sablefish in central Gulf of Alaska through most of December. One long-liner was reported, in mid-December, fishing off eastern Aleutians north of Fox Islands.



#### FREE BCF FISHERY INDUSTRIAL RESEARCH JOURNAL

At intervals, the Bureau of Commercial Fisheries publishes "Fishery Industrial Research," a journal of research papers dealing primarily with fishery technology--fishing methods, marketing, fish preservation, etc.--and occasionally with economics.

Anyone may receive this journal by requesting to be put on the mailing list. Write to:

Bureau of Commercial Fisheries  
Branch of Reports  
Bldg. 67, U. S. Naval Air Station  
Seattle, Washington 98115



## STATES

## Massachusetts

## SEA HERRING FISHERY CHANGES

During 1967, tactics and fishing areas shifted in the Massachusetts sea-herring purse-seine fishery. Before, the fishery centered in the Cape Cod area during spring and fall. Landings were under 2 million pounds. An airplane spotted surface schools, which were fished with shallow purse seines.

In fall 1967, Canadian herring seiners fished the offshore waters near Cape Ann. They used sonar gear to locate subsurface schools and were equipped with deep seines. The catches were unloaded directly from seines to U. S. fishing vessels, redocumented as carrier vessels, and landed at Gloucester, Mass.

From August through November 1967, Gloucester landings--classed duty-free imports--were about 12 million pounds. Over one half was landed during October.



## California

## 1967 PELAGIC FISH LANDINGS DROPPED

The Resources Agency of California reported in December 1967 the pelagic fish catch for that month and for 1967:

Species	December		January 1 - December 31		10Yr. Mean 1956-1965
	1967 <sup>1</sup> /	1966	1967 <sup>1</sup> /	1966	
	. . . . . (Landings in Tons) . . . . .				
Anchovy . . . . .	1,360	6,196	33,166	31,140	7,353
Mackerel, jack . .	1,215	1,169	18,426	20,431	36,584
Mackerel, Pacific .	10	185	379	2,315	19,046
Sardines . . . . .	5	4	76	439	26,774
Squid . . . . .	800	1,183	9,632	9,513	6,394
Total . . . . .	3,390	8,737	61,679	63,838	96,151

<sup>1</sup>/Estimated. Accumulated landings are revised monthly.

<sup>1</sup>/Estimated. Accumulated landings are revised monthly.

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## LANDINGS OF ANCHOVIES

The current anchovies-for-reduction season runs from Sept. 15, 1967-May 15, 1968.

Through Jan. 1, 1968, California fishermen landed 5,413 tons of anchovies for reduction, reports the California Department of Fish and Game. This was 2,013 tons over landings reported in December 1967.

The Department said the price for anchovies at San Pedro remain unsettled. Los Angeles fishmeal prices--about \$124 a ton--remain below those of previous years. This probably is an obstacle to achieving price agreement at San Pedro.

## Quota Set in August 1967

In August 1967, the Fish and Game Commission approved California's third consecutive anchovy reduction season. It set a 75,000-ton quota, the same as in past seasons. But the quantity to be taken in inshore zones is lower and the zones smaller. The bulk of the landings through January 1, 4,600 tons, was in the Northern permit area--north of Point Conception.

## 191,000 Anchovies Tagged

As of early January, 190,986 anchovies had been tagged by Department personnel. During December 1967, 13 tags were recovered, bringing total to 523. Twelve of the 13 tags were brought in at Monterey, and one at San Pedro. The fish had been free from 119 to 645 days. A tagged anchovy taken at San Pedro apparently had been eaten by a bonito or mackerel; the tag was recovered from a plant processing only the larger predator.

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SAN FRANCISCO CRAB FISHERY  
IS DECLINING

The San Francisco crab fishery has declined to the point where about one-third the vessels have stopped fishing, reported the Resources Agency of California in December 1967. Some of these entered the northern California fishery. Approximately 40 vessels are still in the fishery.

Strong winds, coupled with poor catches, caused most fishermen to pull gear only once or twice a week. As of mid-December 1967, about 525,000 pounds had been landed in the San Francisco area. The price to fishermen dropped from 30 to 22 cents per pound the day after the northern California opening on December 1.

## N. California Price Even Lower

In northern California, the price for crab dockside was 18 cents per pound. The season started slowly. Bad weather kept most of the fleet tied up the first week. Weather improved during the second week, and fishermen in Eureka and Crescent City were able to land approximately 1.4 million pounds by December 17. On December 18, a price dispute kept boats tied up until December 21. Then dealers agreed to continue to pay 18 cents per pound, with specified poundage market limits.



## Oregon

### SPRING CHINOOK SALMON RELEASES UNDERWAY

The annual Willamette River spring chinook salmon releases are underway at its hatcheries, reports the Oregon Fish Commission. Until mid-March, the Willamette River from Eugene to the mouth of the Columbia River will be full of young ocean-bound migrants. When the season's releases are complete, more than five million 5- to 6-inch-long spring chinook will be on their way to the sea.

In December 1967, about 1,800,000 smolts--salmon ready to migrate immediately upon release--were liberated from the Fish Commission's Willamette and McKenzie Hatcheries. Those releases were followed in January 1968 by "1,680,000 from Marion Forks Hatchery into the North Santiam below Big Cliff Dam, another 1,300,000 into the Middle Fork Willamette from the Willamette Hatchery, 200,000 from the McKenzie Hatchery, and 150,000 from the South Santiam Hatchery."

In early January 1968, over 50,000 spring chinook smolts from the Sandy Hatchery were released into the upper reaches of the Sandy River. In addition to the smolts, the commission also has ready to release three million unfed fingerlings. One million will go into Green Peter Reservoir and another million into Fall Creek Reservoir. Foster Reservoir on the South Santiam and the Mollala River each will receive one-half million fry.

## 1967 Run Largest Since 1956

The 1967 Willamette River spring chinook run was the largest since 1956. A record number of adult salmon returned to the Commission's hatcheries. Hatcherymen took an additional 2½ million spring chinook eggs for the Washington Department of Fisheries' mammoth hatchery on the Cowlitz River.

More than 1,600 of the adult salmon that returned to the commission's Willamette hatcheries were transplanted into the upper Clackamas River. Another 800 were transferred to the Fish and Wildlife Service hatchery on Eagle Creek; over a thousand were hauled to Fall Creek and Green Peter Reservoirs for natural spawning.



## Florida

### EXPERIMENT IN 'FARMING THE SEAS'

Florida State University is "farming the seas" in an experiment to raise shrimp from the larval stage. Dr. Carl H. Oppenheimer, chairman of the department of oceanography, said his department will study the feasibility of growing shrimp on a commercial scale using indoor tanks.

Dr. Oppenheimer said shrimp never have been grown commercially in the U. S., but the Japanese cultivate fish, shrimp, oysters, and other sea animals in large quantities. He has visited some Japanese installations.

The experiment is supported by a \$35,000 grant from Armour Research and Development Company.



## Michigan

### PLAN SET FOR COMMERCIAL GILL NET FISHING

Regulations concerning the use of gill nets by commercial fishermen in Michigan waters of the Great Lakes were approved by the Michigan Conservation Commission at its December 1967 meeting, reports the Great Lakes

News Letter. They are expected to protect trout and salmon stocks being planted in the lakes without severely restricting commercial operations. The action is a compromise. An earlier proposal had called for a virtual ban on gill nets on the state's sections of Lakes Michigan and Superior.

The plan becomes effective in April 1968. It calls for a permit system to regulate the use of small-mesh gill nets-- $2\frac{1}{2}$  to  $2\frac{3}{4}$  inches--in waters less than 35 fathoms, and nets of  $4\frac{1}{2}$ -inch mesh or larger at depths designated by the Department of Conservation. No restriction will be placed on small-mesh nets used in waters over 35 fathoms deep. Permit holders will be required to submit catch records. The data will aid in fishery management.



## Alaska

### SCALLOPS ARE NEWEST FISHERY

The Alaska fishing industry has shown increasing interest in the commercial prospects for sea scallops since BCF's "John R. Manning" located good concentrations in the Gulf of Alaska in 1963.

Industry interest was turned into action by two recent developments: the slump in king crab landings, down 20 percent in 1967, and the sharp increase in East Coast scallop prices which, in December 1967, was \$1.30 per pound, compared with 65 cents a year earlier.

BCF's Exploratory Fishing and Gear Research Base has loaned scallop dredges and other gear to interested vessel owners. Two Kodiak-based vessels, "Virginia Santos" and "Cloverleaf," went looking for scallops near Kodiak--with some success.

#### How Vessels Fared

The Virginia Santos, with an experienced Nova Scotian scallop fisherman aboard, took

1,500 pounds of scallops in a short day on the flats very close to Kodiak. On another short trip, 4 hours' dragging time, she took 70 bushels; one 30-minute drag produced 20 bushels. Everyone concerned with the operation was optimistic. The experienced scallop fisherman said that their catches could be regarded as good as anywhere.

The Cloverleaf, fishing in Raspberry Straits (Afognak Island) with a home-made rake affair, delivered 4,000 pounds to Point Chehalis Packing Co. on her last trip. Recovery was running about 13.2 percent.



## Texas

### QUALIFIES FOR U. S. AID AS RESULT OF HURRICANE BEULAH

Texas qualifies for up to \$50,000 of U. S. aid to restock the oysters killed by Hurricane Beulah in September 1967, reports the Coastal Fisheries Coordinator for the Texas Parks and Wildlife Department. A notice from the Secretary of the Interior said the State was eligible for funds set aside for the rehabilitation and restoration of natural resources because the oyster loss resulted from "natural causes."

#### Central Coastal Area Considered

The State is considering reseeding oysters in the central coastal area, where ram-paging rivers devastated the oyster beds. The San Antonio-Espiritu Santo Bay System is an area where reseeding could reestablish oysters faster than could natural spawning from surviving stock in nearby areas.

Oysters would be transplanted on historically productive reefs in the spring--after the oyster fishing season and just before the spawning period.





## BUREAU OF COMMERCIAL FISHERIES PROGRAMS

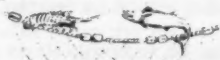
### Pacific Hake's Behavior Limits Efficient Harvest to Daylight Hours

Research by BCF's Exploratory Fishing and Gear Research staff at Seattle, Wash., has revealed knowledge useful to the commercial fleet about the daily vertical movement of Pacific hake. As sunset approaches, the dense schools of hake present near the sea bottom during daylight hours begin to rise and disperse. As sunrise approaches, the hake begin to descend again toward the bottom and regroup. During early-morning daylight hours, the hake have resumed schooling near the bottom. Exploratory catch rates of hake were much higher during daylight than during night fishing in the same general area where hake signs were detected by electronic gear.

#### Catch Rates

Catch rates with a modified "Cobb" pelagic trawl ranged from 10,000 to 60,000 pounds per half-hour for daylight fishing--compared to 60 to 6,000 pounds per half-hour during late-evening and night fishing. This behavior pattern limits efficient harvest of the fish with existing fishing techniques to daylight hours.

The daily vertical migrations of hake coincide with the daily vertical movement of euphausiids, a dominant shrimplike food organism of the hake. However, the daily changes in vertical distribution and integrity of hake schools may occur with or without euphausiids present.



### Shad Bests Nehu as Skipjack Bait

The threadfin shad (*Dorosoma petenense*) produced higher catch rates than did nehu (*Stolephorus purpureus*) as live bait for skipjack tuna (*Katsuwonus pelamis*) in Hawaiian waters. (BCF's "Charles H. Gilbert," Cruise 106, Oct. 30-Nov. 28, 1967.)

Experimental pole-and-line fishing using these baits was conducted with 4 tuna schools 8 to 28 miles west and northwest of Niihau Island. Threadfin shad also was chummed in

the vicinity of bird flocks on 5 other occasions; small skipjack tuna were observed to come to the stern on 2 of these occasions.

The experimental fishing results are:

Station No.	No. of Fishing Periods	Skipjack Catch		Skipjack Catch Per Minute	
		Shad	Nehu	Shad	Nehu
5	7	128	90	6.9	6.2
6	6	143	65	15.9	7.6
8	10	158	32	10.2	2.2
9	1/2	42	26	4.7	8.7
Total . . . . .		471	213	9.4	6.1

1/Ran out of nehu after first fishing period.

Except at station 9 (see map), where highly unequal fishing periods make results questionable, the threadfin shad produced higher catch rates than did nehu. This is attributed to a marked difference in the behavior of the two baits. Most threadfin shad tended to swim downwards at angles of about 20°-45°, while most nehu swam downwards at angles of about 40°-80°. The nehu also swam faster than the shad. This resulted in the skipjack being distributed deeper in the water when nehu were fished--and closer to the surface (and the hooks) when shad were fished.

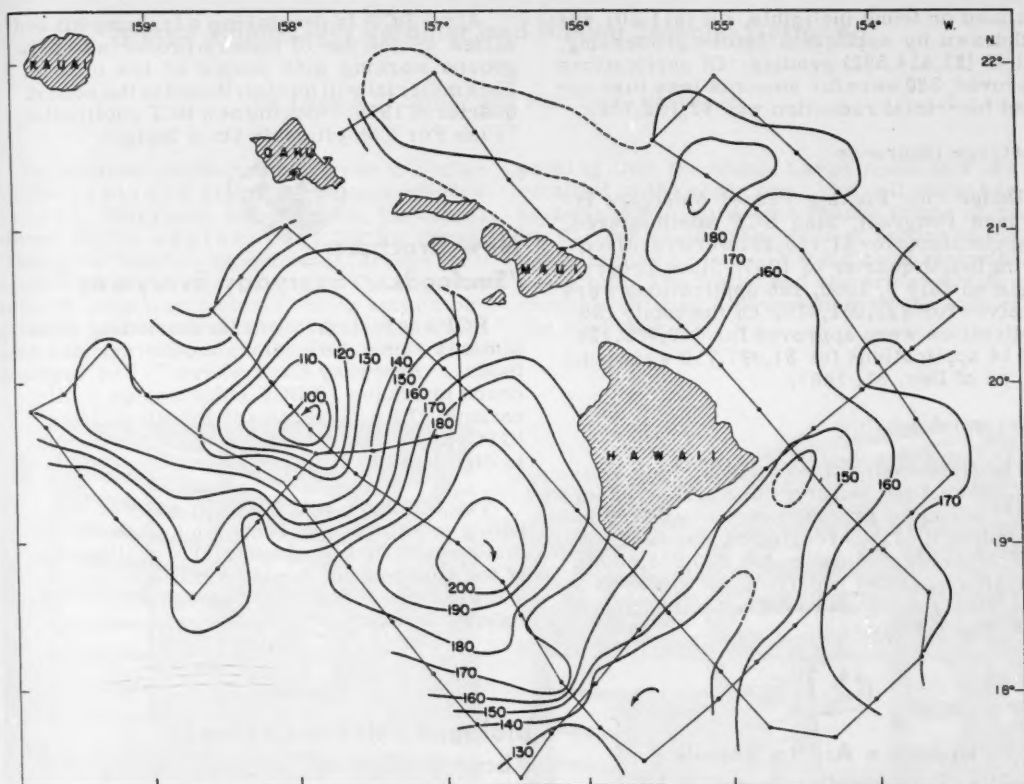
The total catch of skipjack was 694. The range in fork lengths was 49.1-67.1 cm., the range in weight was 6.5-18 pounds.

#### Determine Thermocline Structure

A second major mission of the Gilbert was to determine the thermocline structure in the vicinity of the Hawaiian Islands.

A total of 101 BT lowerings was made. Two major eddies, each 100 miles in diameter, were located southwest of the islands. One, with its center near 20° N. and 158° W., rotated counterclockwise, raising the thermocline approximately 70 m. above its equilibrium level. The other, located near 18.5° N., 156.5° W., rotated clockwise, depressing the thermocline some 70 m. Over the rest of the cruise track, to the south and east of the islands, the thermocline was relatively featureless and flat.

There was some evidence that the two large eddies moved westward during the 2-week duration of the study, but it was not possible to



Track chart for Charles H. Gilbert cruise 106 showing depth of 20° isotherm (meters), Nov. 15-28, 1967.

determine the extent of this motion with a single ship in the time available.

Surface current velocities of 1 to 2 knots were associated with the eddies, as judged by the set experienced by the ship.



### Lake Superior Smelt and Chub Catches Are Good

Despite winter conditions, BCF-directed exploratory fishing in Lake Superior using the privately owned trawler "Hiawatha" (out of Duluth, Minn.) produced fair-to-good catches of smelt and chubs.

One 4-day cruise in early December 1967 landed an average 599 pounds per hour of

mixed smelt and chubs. A later 4-day December cruise landed 26,439 pounds of virtually pure smelt at average rate of 2,937 pounds per hour.

About 60 percent of smelt caught during both cruises were jumbo size: 4 to 6 fish per pound in the round.



### Report on Financial Aid to Fishing Industry

From the beginning of the Federal Fisheries Loan Fund in 1956 through Dec. 31, 1967, 2,058 applications for \$55,011,668 were received by BCF, the administering agency. By that date, the record was: 1,066 applications (\$24,957,653) approved, 640 (\$15,385,223)

declined or found ineligible, 303 (\$11,101,494) withdrawn by applicants before processing, and 49 (\$1,414,592) pending. Of applications approved, 380 were for amounts less than applied for--total reduction was \$2,152,706.

### Mortgage Insurance

Under the Fishing Vessel Mortgage Insurance Program, also BCF administered, 11 applications for \$1,116,837 were received during fourth quarter of 1967. Since program began on July 5, 1960, 186 applications were received for \$22,051,879. Of the total, 150 applications were approved for \$17,939,124 and 14 applications for \$1,997,712 were pending, as of Dec. 31, 1967.

### Differential Subsidy

The first applications for a Fishing Vessel Construction Differential Subsidy, under BCF's expanded program, were received in December 1964. Through Dec. 31, 1967, 86 applications for an estimated \$20,936,500 in subsidies had been received. Of these, 56 applications were approved for eligibility after Public Hearings.



### BCF to Increase Aid to Retailers in Selling Fishery Products

BCF will increase its efforts to help retailers sell their fishery products. It has arranged to present its techniques of seafood merchandising to the annual convention of the Supermarket Institute at Cleveland in May. BCF will prepare its presentation with technical assistance from the National Fisheries Institute. After the convention BCF will work with local groups.



### Useful Information for Low-Income Groups Prepared

BCF contributed information on fish to a 120-page booklet, "Project Headstart Food Buying Guide And Recipes," recently published by the Office of Economic Opportunity (OEO). OEO has distributed 150,000 copies.

Also, BCF is developing a training kit and slides on the use of fishery products to help groups working with people of low income. This material will be distributed in the second quarter of 1968--with the new BCF publication, "Fish For Compliments On A Budget."



### New Brochure: "Seafoods... Everyday Everywhere"

BCF has distributed to its marketing field stations a new, full-color, brochure--"Seafoods... Everyday Everywhere." The brochure promotes 10 BCF color recipe publications. The Government Printing Office (GPO) has bought an additional 250,000 copies to distribute to its selected mailing list.

The brochure will be given away at marketing meetings and conventions. It will be mailed to news media to publicize availability of the color recipe booklets through GPO--and to increase public knowledge about U. S. fishery products.



### Biologist Talks to Fishermen About Biological Oceanography

Biologist Kenneth Sherman of the BCF Biological Laboratory, Boothbay Harbor, Maine, has been giving a series of talks on biological oceanography and Gulf-of-Maine herring to meetings of Maine State Marine Fisheries Extension Committees. This is the second series given by the laboratory's biologists at these meetings.

The first dealt with observations on lobsters made by SCUBA divers.

The talks, generally well received, are considered a valuable way to acquaint fishermen with BCF programs, goals, and accomplishments.



## Special Small-Clam Retainer and Bottom Sampler Designed

By Lars A. Fahlen\* and Phillip S. Parker\*\*

In the survey conducted last year to evaluate the availability of surf clams off New Jersey, Maryland, and Virginia, personnel aboard BCF's exploratory fishing vessel "Delaware" used an experimental dredge with a small-clam retainer (fig. 1). The retainer collects small surf clams, other bottom organisms, and materials that otherwise would pass through the peripheral slots of the dredge.

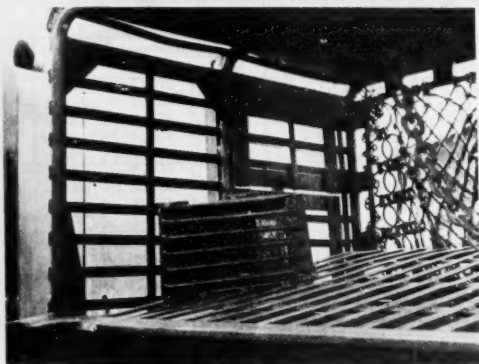


Fig. 1 - Entrance to small-clam retainer mounted in bottom of a surf-clam jet dredge.

The technique used can be utilized by other research agencies. The collecting unit can be fitted on any dredge similar to the sea clam dredge.

### The Retainer or Sampler

The specially constructed retainer or sampler is a triangular-shaped box that has steel rods across the entrance and a collecting bag on the back side. The entrance has  $\frac{1}{2}$ -inch round steel welded horizontally  $1\frac{1}{2}$  inches apart. The rods allow small items that are washed out of the bottom, and those that lie on the bottom, to pass into the sampling unit--but prevent the large materials from

passing into the unit. Large materials are retained in the chain bag. The collecting bag is attached to an 8-inch square frame of  $\frac{1}{2}$ -by  $1\frac{1}{4}$ -inch angle iron. Size of netting in the sampling bag controls the size of material collected. The frame and bag are easily accessible through a hinged door on the side of the sled cage (fig. 2).

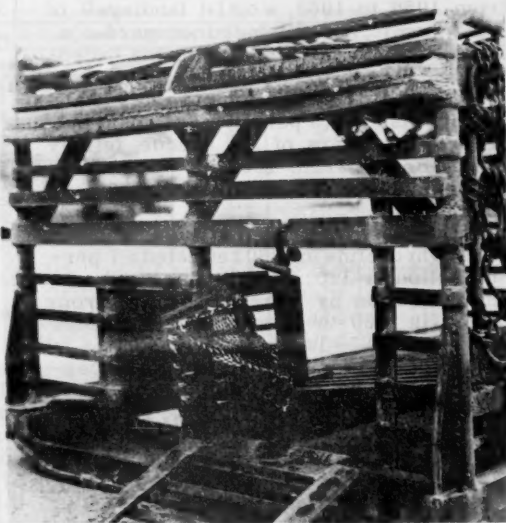


Fig. 2 - Small-clam retainer bag and hinged door in side of jet dredge. Door provides easy access to collecting bag.

The sampler is attached to the inner right side of sled cage and is positioned so that its collecting bag is well forward of the chain bag at rear of cage. As retainer is attached to dredge, small surf clams and small-size materials are taken whenever the experimental dredge is used in normal fishing operations.

\*Fishery Methods and Equipment Specialist

\*\*Fishery Biologist

Note: This is Equipment Note No. 23.

Exploratory Fishing and Gear Research Base, BCF, Gloucester, Mass. 01930

U. S. DEPARTMENT OF THE INTERIOR  
Fish and Wildlife Service  
Sep. No. 807

# WORLD RAW AND CANNED TUNA SITUATION

By Liaqat Ali\*

There is a dearth of comprehensive and reliable data on the world tuna economy<sup>1</sup>--particularly about the disposition of tuna landings in such processed forms as frozen and canned tuna, and the consumption of various types of tuna. Despite these deficiencies, however, Tables 1 to 5 (world raw tuna landings and disposition) and Tables 6 to 10 (canned tuna production and disposition) provide a useful partial picture. These figures ought to be looked at with care. A reconciliation of data in some tables has been found impracticable.

## Raw Tuna and Tunalike Fish

From 1956 to 1965, world landings<sup>2</sup> of raw tuna, bonito, and skipjack increased continuously from 1956 to 1963, with the exception of 1960. They rose from 805,000 metric tons to 1.3 million metric tons (Tables 1 and 2)--an increase of 6.6 percent per annum but, in the last two years of the decade, fell by about 4 percent from 1963. Nevertheless, world landings in 1956 to 1965 rose 4.6 percent per annum.

The slight decline in 1960 reflected a 7 percent reduction in Japanese landings and a 15 percent reduction by "other countries" from 1959. But in 1960 these two areas exceeded their 1958 and 1959 landings. The decline in 1964 is accounted for by a decline of 18 percent in Peruvian and 8 percent in "other countries" landings from 1963. In 1965, Peruvian landings declined by 24 percent from 1964, and Japanese landings also fell slightly. On the basis of a least squares regression<sup>3</sup>, the upward trend in supplies in 1956 to 1965 was maintained at an annual rate of 4.9 percent. However, between 1958 and 1965 the growth rate slowed, and it rose only 3 percent per year.

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Note: The tuna and tunalike fish in this article include: Albacore, Bigeye Tuna, Bluefin Tuna, Bonitos, Frigate Mackerels, Little Tunas, Skipjack, Yellowfin Tuna, and various tunalike scombriforms.

<sup>1</sup>/From the beginning of 1956, FAO changed its fishery classification system. Hence the data prior to 1956 are not comparable. "World" excludes the Sino-Soviet Bloc.

<sup>2</sup>/Over 70 percent of total world landings are accounted for by Japan, U.S.A., and Peru.

<sup>3</sup>/Least squares regression is a mathematical technique to produce the closest approximation of a line that will go through a set of data from the real world. It is used often to extend (project) a line on a chart to arrive at a likely future situation. It is used too to show a past situation.--Ed.

<sup>4</sup>/There appears to be some discrepancy in either the total landings figures or in the canned tuna production. The latter figures are perhaps slightly more reliable because one would expect processing plants to supply more definite data. However, reconciliation is not possible.

Of total landings of tuna and tunalike fish in 1956 and 1957, about 75 percent and 81 percent respectively<sup>4</sup> were used for canned production. Since then, the percentages have varied between 52 and 57. A detailed discussion of the canned tuna situation is given on pages 27-30.

For 1956-65, apparent direct world consumption of raw tuna and tunalike fish has been arrived at in Table 5 by deducting from total landings the net exports of fresh and frozen tuna, and fresh and frozen tuna used for canned-tuna production. The result follows:

Year	Apparent Raw Consumption (Table 5)
	Landed Weight 1,000 Metric Tons
1956. . . . .	276.6
1957. . . . .	262.5
1958. . . . .	410.2
1959. . . . .	474.5
1960. . . . .	432.4
1961. . . . .	592.3
1962. . . . .	554.9
1963. . . . .	592.2
1964. . . . .	488.5
1965. . . . .	441.7

It is obvious that there is some serious discrepancy in the figures for 1956, 1957, and 1958.

## Japan A Leading Consumer

Based on Table 5 data, most of the apparent world direct consumption of fresh tuna takes place in less-developed countries. In 1956 and 1957, Japan, Turkey, and Peru accounted for over 80 percent of apparent world direct consumption of raw tuna; Japan's share was 57 percent and 66 percent, respectively. In the following years, the share of these three countries in total consumption of raw tuna varied between 65 and 71 percent. Japan still remained the largest single consumer, but its share fluctuated between 44 and 55 percent.



Table 1 - World Total Landings of Raw Tunas, Bonitos and Skipjacks, 1956-65<sup>1/</sup>

Year	Total Landings	Landed Weight Equivalent Used for Canned Tuna Production <sup>2/</sup>
	... (Landed Weight, 1,000 Metric Tons) ...	
1956	804.7	604.0
1957	811.9	656.0
1958	995.0	516.0
1959	1,066.5	560.0
1960	1,057.1	598.0
1961	1,234.0	648.0
1962	1,243.1	644.0
1963	1,257.6	664.0
1964	1,212.0	670.0
1965	1,205.0	696.0

<sup>1/</sup>Excluding Eastern Europe and China (Mainland).<sup>2/</sup>World canned tuna production has been converted to landed weight raw tuna basis by increasing the former (canned production) by 100 percent.

Source: FAO Yearbooks of Fishery Statistics.

Table 4 - Destination of Exports of Frozen Tuna and Tunalike Fish, 1956-65<sup>1/</sup>

Year	Canada	U.S.A.	E.E.C.	Others	Total
	... (1,000 Metric Tons) ...				
1956	2.2	67.3 (69.0)	13.0	3.8	86.3
1957	1.0	78.5 (86.0)	11.8	11.6	102.9
1958	2/	99.5 (119.4)	14.2	13.8	127.5
1959	1.1	109.3 (141.6)	21.1	33.7	165.2
1960	1.7	102.3 (133.8)	17.9	44.3	166.3
1961	1.1	95.4 (121.8)	24.4	53.6	174.5
1962	1.7	108.1 (161.5)	31.4	53.7	194.9
1963	1.5	94.9 (142.7)	37.3	52.7	185.9
1964	1.8	128.3 (169.2)	27.9	46.2	204.2
1965	2.5	116.4 (169.5)	31.9	45.0	195.8

<sup>1/</sup>Includes Czechoslovakia, East Germany and Yugoslavia but excludes USSR, Rest of Eastern Europe and China (Mainland).<sup>2/</sup>Negligible or insignificant.

Note: U. S. figures in brackets are from U. S. Department of Interior, BCF.

Source: FAO Yearbooks of Fishery Statistics.

Table 2 - World Landings of Tunas, Bonitos, and Skipjacks, 1956-1965<sup>1/</sup>

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
	... (Landed Weight, 1,000 Metric Tons) ...									
<b>Africa:</b>										
Angola . . . . .	10.0	10.6	10.8	14.4	8.6	8.5	9.7	8.5	7.8	8.4
Morocco . . . . .	6.0	7.0	16.2	7.1	8.9	8.1	8.5	9.8	8.8	9.6
Tunisia . . . . .	1.5	1.7	1.3	-	-	-	-	-	-	-
<b>North America:</b>										
Canada . . . . .	0.2	0.1	2/	0.2	0.2	0.1	0.3	0.5	1.1	0.6
Cuba . . . . .	-	-	-	-	3.2	3.0	1.2	2.4	1.6	2.2
Mexico . . . . .	0.8	0.6	2.7	4.1	3.9	3.4	4.4	4.5	4.6	4.3
U.S.A. . . . .	161.2	146.8	159.0	141.2	145.4	165.8	155.7	164.6	161.9	172.9
<b>S. America:</b>										
Argentina . . . . .	2/	2/	2/	1.1	2.1	1.7	1.3	2.7	2.0	1.8
Brazil . . . . .	-	-	-	6.4	5.5	5.5	4.7	4.3	2.6	-
Chile . . . . .	5.4	2.6	4.0	2.6	2.4	3.7	2.4	2.7	6.2	11.3
Ecuador . . . . .	6.8	9.9	11.8	14.8	19.1	11.7	11.4	13.5	9.8	14.8
Peru . . . . .	97.0	71.2	85.1	116.2	124.1	134.2	113.9	118.8	97.2	74.0
<b>Asia:</b>										
China (Taiwan) . . . . .	16.7	17.4	19.9	21.3	17.2	23.4	32.2	28.2	32.2	26.8
Israel . . . . .	0.2	0.3	0.5	0.5	0.5	0.7	1.0	0.9	1.1	1.5
Japan . . . . .	356.6	397.6	455.0	518.3	483.9	593.7	641.2	614.3	607.0	592.0
Korea, South . . . . .	2/	2/	2/	2/	2/	2/	2/	2.8	5.4	-
Turkey . . . . .	55.5	40.7	27.6	11.1	32.5	42.1	4.0	19.2	11.2	-
<b>Europe:</b>										
France . . . . .	17.4	25.1	28.7	22.7	31.8	30.0	34.2	38.3	40.8	35.2
Greece . . . . .	3.3	5.3	1.3	0.9	-	-	-	3.4	3.5	3.8
Italy . . . . .	-	-	3.4	3.3	2.6	4.2	3.1	4.0	3.7	3.4
Portugal . . . . .	6.9	10.1	7.0	9.4	9.0	9.0	11.2	13.3	9.4	11.8
Spain . . . . .	40.2	42.2	56.2	43.9	46.6	35.3	53.8	51.4	51.9	57.2
<b>Oceania:</b>										
Australia . . . . .	0.5	1.0	1.4	2.5	3.2	4.4	4.8	5.0	8.1	7.2
<b>Others</b> . . . . .	18.4	21.7	98.1	124.5	106.4	145.5	144.1	144.5	134.0	169.0
<b>Total</b> . . . . .	804.7	811.9	995.0	1,066.5	1,057.1	1,234.0	1,243.1	1,257.6	1,212.0	1,205.0

<sup>1/</sup>Excluding Eastern Europe and China (Mainland).<sup>2/</sup>Negligible or insignificant.

Source: FAO Yearbooks of Fishery Statistics and U. S. Department of Interior, BCF, for U. S. figures.

Table 3 - Exports of Frozen Tuna and Tunalike Fish, 1956-1965

Country	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
	... (1,000 Metric Tons) ...									
Canada . . . . .	4.4	4.8	3.5	3.9	2.8	0.3	0.4	1.2	0.7	0.9
Japan . . . . .	58.7	74.1	102.1	128.6	140.4	148.0	170.5	157.2	187.4	177.8
Norway . . . . .	6.6	6.2	5.1	7.0	5.3	6.5	4.1	4.8	2.9	6.5
Denmark . . . . .	2.6	3.7	-	-	-	-	-	-	-	-
Sweden . . . . .	1.4	1.9	-	-	-	-	-	-	-	-
Peru . . . . .	12.6	12.2	16.8	25.7	117.8	19.7	19.9	22.7	13.2	10.6
<b>Total</b> . . . . .	86.3	102.9	127.5	165.2	166.3	174.5	194.9	185.9	204.2	195.8

Source: FAO Yearbooks of Fishery Statistics.

Table 5 - Apparent World Consumption of Raw Tuna and Tunalike Fish, 1956-65<sup>1/</sup>

Country	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
	(Landed Weight, 1,000 Metric Tons <sup>2/</sup> )									
Portugal . . . . .	-	-	1.2	-	-	-	0.6	1.5	-	-
Spain . . . . .	-	-	-	11.9	12.2	7.5	17.8	13.4	21.5	15.0
Japan . . . . .	157.9	172.3	217.3	220.1	190.6	271.9	303.3	289.5	243.8	257.6
Turkey . . . . .	53.7	39.1	25.8	10.7	31.7	41.9	3.8	19.2	11.2	-
Morocco . . . . .	2.4	-	11.2	1.7	3.1	0.9	-	9.0	2.2	1.6
Peru . . . . .	33.0	9.0	33.9	82.8	59.0	108.6	58.2	89.3	80.0	35.0
Rest of World <sup>3/</sup> . . . . .	29.6	42.1	120.8	147.3	135.8	161.5	171.2	170.3	129.8	132.5
Total . . . . .	276.6	262.5	410.2	474.5	432.4	592.3	554.9	592.2	488.5	441.7

1/Excluding Eastern Europe and China (Mainland).

2/Apparent world consumption has been arrived at by deducting from total landings the net exports of fresh and frozen tuna, etc. (frozen tuna was converted to landed weight by increasing its weight by 30%) and of tuna, etc., used for canned production (canned tuna was converted to landed weight by increasing it by 100%).

3/Some of the main countries included in this group are: Angola, Mexico, Argentina, Brazil, Chile, Ecuador, and China (Taiwan). Source: FAO Yearbooks of Fishery Statistics.

Table 6 - World Production and Exports of All Fish in Airtight Containers, 1956-1965<sup>1/</sup>

Year	Production			Exports		
	Total	Of Which Tuna, Etc.	Tuna, Etc. as % of Total	Total	Of Which Tuna, Etc.	Tuna, Etc. as % of Total
	(1,000 Metric Tons)					
1956	1,263.0	302.0	24	368.5	56.6	15.4
1957	1,287.0	328.0	25	359.2	72.6	20.2
1958	1,321.0	258.0	20	421.3	49.9	11.8
1959	1,359.0	280.0	21	457.2	61.1	13.4
1960	1,466.0	299.0	20	444.9	58.6	13.1
1961	1,547.0	324.0	21	455.6	66.1	14.5
1962	1,562.0	322.0	21	465.8	65.6	14.0
1963	1,517.0	332.0	22	423.3	64.7	15.3
1964	1,637.0	335.0	21	542.0	67.0	12.4
1965	1,702	348.0	20	483.0	62.0	12.8

1/Excludes Eastern Europe and China (Mainland).

Source: FAO Yearbooks of Fishery Statistics.

Japan consumed 43 to 47 percent of its total landings, except in 1960 and 1964, when the figure dropped to about 40 percent simultaneously with a drop in landings. Fluctuations in consumption appear to depend on fluctuations in domestic catch. Peru's raw tuna consumption fluctuated between 13 and 82 percent of her total landings. There does not appear to be any stable growth pattern in consumption since 1959. Turkey's landings declined from 54,000 metric tons in 1956 to 11,200 tons in 1965--and with them consumption. It appears that the pattern of raw tuna consumption in major areas largely reflects the availability of domestic supplies, and perhaps traditional eating habits as well. Nevertheless, consumption of raw tuna has increased in Japan from 1956 to 1965 by 5.6 percent per year. These figures should be looked at cautiously, especially in projecting future demand.

#### Consumption by Rest of World

Apparent direct consumption of raw tuna in the "rest of the world" shows an almost continuous increase from 29,600 tons in 1956 to

170,000 tons in 1963--even after allowing that the data for the early years are probably not homogeneous. But in the following two years, when total landings declined, consumption fell to around 130,000 to 133,000 tons. Assuming greater homogeneity in the available statistics since 1958, the rate of growth through 1963 appears to be 7.1 percent per annum. However, in 1958 to 1965, rate of growth dropped to 1.1 percent per annum. Almost all countries in this group catch their own tuna for domestic direct consumption.

In 1956-1965, least squares regression indicate that direct consumption of raw tuna rose at the rate of about 6.2 percent per year based on Table 5 but, from 1958 to 1965, increased only by about 2 percent per annum.

During 1956-65, most of the world's landings of raw tuna and tunalike fish were consumed within their landing areas. A very small proportion of total landings enters international trade. In recent years, about 10 to 17 percent of total landings was exported in the form of frozen tuna.

<sup>5/</sup>Some countries included in this group are: Angola, Mexico, Argentina, Brazil, Chile, Ecuador, and China (Taiwan).



## World Exports Rose

World exports of frozen tuna and tunalike fish rose from 86,300 metric tons in 1956 to 204,200 metric tons in 1964 (Table 3)--an 11.3 percent rate per annum. In 1963, however, they declined 4.6 percent from 1962, but this was accounted for by a drop in Japan's total landings. In 1965, they fell 4 percent from 1964, in line with declines in Peruvian and Japanese landings. Based on a least squares regression, the growth rate between 1956-65 was 8.7 percent per annum; in 1958 to 1965, it rose only 5.3 percent per year. This means that the world exports of frozen tuna and tunalike fish in 1956 to 1965, or in 1958 to 1965, rose faster than landings and consumption of raw tuna (Table 5).<sup>6/</sup>

Among individual exporters of frozen tuna and tunalike fish, Japanese exports accounted for nearly 70 to 92 percent of total world exports. Japan was followed by Peru with 5 to 16 percent. Japanese exports of frozen tuna and tunalike fish increased continuously from 58,700 tons in 1956 to 187,400 tons in 1964--up about 17 percent per annum.<sup>7/</sup> But in 1963, exports fell about 7 percent below 1962 and, in 1965, 5 percent below 1964. This was due perhaps to low landings in those years. On the other hand, Peruvian exports of frozen tuna and tunalike fish fluctuated from year to year with no detectable trend. For example, Peru recorded in 1961 its highest landings, but exports of frozen tuna and tunalike fish fell to 19,700 tons. Yet, in 1959, total landings were 116,200 tons, lower than in 1961, and Peru exported 25,700 tons (Tables 2 and 3). On the whole, then, it seems that Japan has maintained a powerful hold over exports of frozen tuna to world markets.

## U. S. and EEC Imports

In recent years, the U. S. and the European Economic Community (EEC), the Common Market, imported nearly 72 to 79 percent of total frozen tuna exports; the U. S. accounted for over 50 percent. However, U. S. imports fluctuated between 67,300 tons and 128,300 tons in 1956-65. Based on a least squares regression, despite wide fluctuations during this period, imports rose at 4.1 percent rate per

annum, which is in line with growth in U. S. consumption of canned tuna.<sup>8/</sup> But, in 1958 to 1965, U. S. imports rose only at 2.3 percent rate per year (least squares regression). However, it should be borne in mind that U. S. landings (Table 2) have remained fairly stable in recent years. But consumption of canned tuna has been increasing<sup>9/</sup>, and this could only be met by imports of frozen tuna. It seems that there is some discrepancy in the figures giving a declining import trend. Alternatively, if BCF figures of U. S. imports (figures in brackets, Table 4) are considered then, based on a least squares regression, the growth in 1956-65 and 1958-65 was 8.3 percent and 4.7 percent per annum. This explains that increased consumption of canned tuna has been met by imports of frozen tuna.

Imports into EEC also fluctuated between 13,000 tons to 37,300 tons per year. On the average, they rose from 13,000 tons per year in 1956-58 to 32,400 tons per year in 1963-65. That is, imports more than doubled.<sup>9/</sup> The apparent growth is credible considering that the absolute quantities are modest and at least one EEC country, Italy, expanded canned tuna production at a similar rate in this period. Consumption of canned tuna in EEC as a whole, however, is increasing at only a 4.3 percent rate per annum. Imports into the "rest of the world" have also increased tremendously--from about 9,700 tons in 1956-58 to nearly 48,000 tons in 1963-65. Yet in most recent years, there has hardly been growth in the "rest of the world". Nevertheless, it accounts for about 28 to 30 percent of total world imports (Table 4).

## 1956-65 Landings and Consumption

Principal findings of the raw tuna situation thus far are that landings in 1956-65 rose at 5 percent rate per annum, but growth rate in 1958 to 1965 slowed to 3 percent per year. World consumption of raw tuna in 1956-65 grew at 6.2 percent rate per year based on Table 5. Most of this growth took place in the developing countries. World exports of frozen tuna during 1958-65 rose 5.3 percent per year; growth during 1956-65 was at 8.7 percent rate per year, but the figures for 1956 and 1957 are not entirely satisfactory.

<sup>6/</sup>Exports of canned tuna barely kept pace with production and consumption of canned tuna and tunalike fish.

<sup>7/</sup>It appears that Japan expanded its frozen tuna exports at a faster rate than exports of canned tuna (see Table 8).

<sup>8/</sup>All imports of frozen tuna in the U. S. are used for canning. In the same period canned tuna consumption rose by 3.3 percent per year.

<sup>9/</sup>In EEC, frozen tuna imports are believed used largely for canning.

## Canned Tuna and Tunalike Fish

In 1956-65, world<sup>10</sup>/production of all fish in airtight containers increased continuously from 1.26 million metric tons to 1.70 million metric tons (Table 6)--up about 35 percent, or a compound annual increase rate of 3.4 percent. Production fell by 3 percent in 1963 (Table 6), but it seems more likely that this is due to natural or cyclical reasons (possibly a short catch in Japan or a drawing down of canned tuna inventories) than to a reversal of the implied long-term demand trend.

World production of canned tuna, bonito, etc., accounted for nearly 25 percent of canned fish production in 1956 and 1957, but it has varied since between 20 and 22 percent (Table 6).

During 1956-65, world production of tuna and similar fish in airtight containers fluctuated between 258,000 and about 348,000 tons per year. There was almost no growth between 1957 and 1963. There was, however, a detectable upward trend during the period as a whole. Based on a least squares regression, it seems fair to say that production did grow by about 1.9 percent per annum, or just over half the rate at which total canned fish production has been growing. The sharp decline in 1958 was due to a decline in production in France, Japan, Peru, and Portugal; in the following years, production growth in those countries was very slow.

### U. S. Ate About Half World's Canned Tuna

In 1956-65, over 75 percent of the apparent world canned-tuna consumption was concentrated in EEC, Portugal, Spain, the U.K., the U. S., Japan, and Mexico. The U. S. consumed most--nearly 50 percent of apparent total world consumption (Table 10). Demand trends varied radically among these countries, however. Consumption in Japan has been declining at the rate of about 14 percent per annum; in Spain, at 2 percent per year from 1956 to 1964<sup>11</sup>; and in the U.K., by about 7 percent (Table 10). On the other hand, consumption in EEC has been increasing at 4.3 percent rate, 1956 to 1964<sup>11</sup>; in the U. S., by about 3.3 percent per annum. These conflicting trends indicate the need for extreme caution in assessing future demand for tuna. The comparative growth rates for the U. S. and EEC are roughly consistent with comparative levels and growth

rates of per-capita income in these areas. However, the same can hardly be said for the U.K., Japan, and Spain. Possibly changes in eating habits in specific countries are as important, if not more so, in determining the demand trend for canned tuna as are the level and trend of per-capita income.

Consumption in the rest of the world appears to have fluctuated with movements in supplies<sup>12</sup>. In 1957 and 1965, when world production of canned tuna was at its highest, consumption in the "rest of the world"<sup>13</sup> reached very high levels. In the intervening years, however, the apparent consumption declined when the supply situation became tighter.

Most of the world's production of all canned fish, and of canned tuna in particular, appears to be consumed within the producing countries. However, a substantial proportion does enter international trade channels. In recent years,  $\frac{1}{4}$  and  $\frac{1}{5}$  of world production of canned fish has been exported. Similarly, around  $\frac{1}{5}$  of world canned-tuna production has gone into export channels. Tuna has accounted for only 12 to 15 percent of world exports of all canned fish, except in 1957, when the proportion reached a high of 20 percent.

### Exports Fluctuate

While world production of all canned fish and canned tuna has tended to increase more or less steadily since 1956, exports have tended to fluctuate rather frequently and quite widely, especially of tuna. Consequently, it is extremely difficult to determine what the trade trend has been. For canned fish as a whole, there undoubtedly was a strong upward trend in export trade between 1956 and 1964, despite downward fluctuations in 1957, 1960, 1963, and 1965. Such exports increased from 368,500 tons to 542,000 tons (Table 6)--up about 47 percent, an average compound rate of 5 percent per year. Exports in 1963 and 1964, however, declined by about 9 percent from 1962 and 1964, respectively. For canned tuna and tunalike fish, the secular trend of world export trade is even more obscure because of extremely wide gyrations early in the period, when an increase of 28 percent in 1957 was followed by a fall of 30 percent in 1958, and another rise of 20 percent in 1959 (all changes measured with respect to level of preceding year). The analysis of exports by destination in Table 9 indicates that these fluctuations may have reflected partly demand factors (see EEC

<sup>10</sup> "World" excludes the Sino-Soviet bloc.

<sup>11</sup> The increase in apparent consumption in Spain and a drop in EEC consumption in 1965 over 1964 (Table 10) appears due to fortuitous circumstances rather than any change in long-term trend.

<sup>12</sup> Consumption is believed to be price elastic, but lack of data on prices prevents any price analysis.

<sup>13</sup> Among the principal countries in this category are Argentina, Canada, China (Taiwan) and Australia.

Africa:
Angola
Morocco
Tunisia
North America:
Canada
Cuba
Mexico
United States
South America:
Argentina
Brazil
Chile
Ecuador
Peru
Asia:
China
Israel
Japan
Korea
Turkey
Europe:
France
Greece
Italy
Portugal
Spain
Oceania:
Australia
Other:
1/Exports
2/Total
3/Net
4/Imports
Source:
Year:
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Table 7 - Production by Countries of Tunas, Bonitos, and Skipjacks, in Airtight Containers, 1956-1965<sup>1/</sup>

	1956 <sup>2/</sup>	1957 <sup>2/</sup>	1958	1959	1960	1961	1962	1963	1964	1965
	(1,000 Metric Tons)									
<b>Africa:</b>										
Angola . . . . .	1.2	1.5	-	-	-	-	-	-	-	-
Morocco . . . . .	1.8	5.5	2.5	2.7	2.9	3.6	4.9	2.6	3.3	4.0
Tunisia . . . . .	0.9	0.6	0.4	-	-	-	-	-	-	-
<b>North America:</b>										
Canada . . . . .	1.0	0.2	0.1	1.1	0.9	0.5	1.4	1.0	2.6	-
Cuba . . . . .	-	0.4	0.3	0.6	-	1.7	0.9	0.7	0.3	0.5
Mexico . . . . .	0.3	-	0.4	0.6	0.7	2.5	1.5	1.9	7.0	6.8
United States . . . . .	112.9	113.8	122.9	124.6	132.7	141.9	152.5	148.8	158.9	162.7
<b>South America:</b>										
Argentina . . . . .	4.1	9.1	-	1.2	2.2	1.1	0.7	2.4	0.9	1.2
Brazil . . . . .	-	-	0.1	0.1	0.2	0.2	0.1	-	0.2	0.2
Chile . . . . .	1.7	1.3	0.9	0.8	0.3	1.4	1.0	0.8	1.8	1.6
Ecuador . . . . .	-	0.4	0.9	1.2	1.6	3.7	2.3	2.8	3.4	3.3
Peru . . . . .	23.8	23.8	14.7	-	21.0	-	14.9	19.0	-	12.7
<b>Asia:</b>										
China (Taiwan) . . . . .	0.3	0.9	0.7	0.4	0.7	1.2	1.5	2.8	3.6	2.1
Israel . . . . .	-	-	0.1	0.2	0.2	0.2	0.2	0.2	0.4	0.5
Japan . . . . .	61.2	64.5	52.5	65.5	55.4	64.7	58.1	60.2	59.8	52.1
Korea, South . . . . .	4.2	5.4	3/	3/	4.3	5.2	0.3	0.1	-	0.1
Turkey . . . . .	0.9	0.8	0.9	0.2	0.4	0.1	0.1	-	-	-
<b>Europe:</b>										
France . . . . .	4/29.4	4/44.6	19.3	22.4	21.4	21.0	22.0	23.0	23.3	-
Greece . . . . .	0.7	1.2	1.2	1.0	-	1.0	1.0	0.8	0.8	0.8
Italy . . . . .	13.0	12.0	15.0	15.0	28.0	32.0	33.2	39.2	35.5	42.0
Portugal . . . . .	9.7	10.6	2.9	4.5	5.2	4.3	5.3	5.9	5.7	7.3
Spain . . . . .	21.6	21.4	21.1	16.0	17.2	13.9	18.0	15.9	15.2	21.1
<b>Oceania:</b>										
Australia . . . . .	0.8	1.5	0.5	0.7	0.9	1.4	1.7	1.9	2.1	2.5
Others . . . . .	12.5	8.5	0.6	21.2	2.8	22.4	0.4	2.0	10.2	26.5
<b>Total . . . . .</b>	<b>302.0</b>	<b>328.0</b>	<b>258.0</b>	<b>280.0</b>	<b>299.0</b>	<b>324.0</b>	<b>322.0</b>	<b>332.0</b>	<b>335.0</b>	<b>348.0</b>

<sup>1/</sup>Excludes Eastern Europe and China (Mainland).<sup>2/</sup>Tunas, Bonitos, Mackerels, Etc., in airtight containers.<sup>3/</sup>Negligible or insignificant.<sup>4/</sup>Includes Algeria.

Source: FAO Yearbooks of Fishery Statistics.

Table 8 - Breakdown of World Exports of Canned Tuna and Tunalike Fish, 1956-65<sup>1/</sup>

Year	Morocco	United States	Peru	Japan	France	Portugal	Spain	Norway	Total
	(1,000 Metric Tons)								
1956	1.5	1.2	16.1	25.8	-	7.6	3.1	1.3	56.6
1957	2.3	7.9	15.5	33.7	-	9.3	3.4	0.5	72.6
1958	2.5	0.1	13.3	29.1	-	2.3	2.6	-	49.9
1959	2.7	0.1	17.3	33.1	-	3.9	4.0	-	61.1
1960	2.9	0.2	15.1	32.4	-	3.4	4.6	-	58.6
1961	3.6	0.1	18.9	35.5	1.3	3.2	3.5	-	66.1
1962	4.9	0.2	13.3	38.6	1.1	3.7	3.8	-	65.6
1963	2.6	0.1	12.9	40.2	0.9	4.0	4.0	-	64.7
1964	3.3	-	15.1	43.9	0.5	2.3	2.3	-	67.4
1965	1.6	-	10.6	42.9	0.5	3.6	2.3	-	61.5

<sup>1/</sup>Excludes Eastern Europe and Mainland China; 1956 and 1957 include mackerel instead of skipjack.

Source: FAO Yearbooks of Fishery Statistics.

Table 9 - Destination of World Exports of Canned Tuna and Tunalike Fish, 1956-65<sup>1/</sup>

Year	E.E.C.	U.S.A.	U.K.	Rest of World	Total
	(1,000 Metric Tons)				
1956	12.7	26.2	6.0	12.0	56.9
1957	14.6	30.6	4.0	22.0	71.2
1958	8.3	26.0	2.8	12.7	49.8
1959	12.6	27.4	2.4	18.7	61.1
1960	15.6	25.1	2.1	15.8	58.6
1961	14.0	27.3	3.4	21.4	66.1
1962	17.3	26.2	2.7	19.4	65.6
1963	15.1	25.0	3.4	21.2	64.7
1964	18.6	23.6	3.9	21.3	67.4
1965	18.2	21.9	3.1	18.2	61.5

<sup>1/</sup>Excludes Eastern Europe and Mainland China.

Source: FAO Yearbooks of Fishery Statistics.

and USA) and partly supply factors (see imports into "rest of world"). If due allowance is made for the distorting effects of the violent fluctuations of the late 1950's, it is apparent that growth has been taking place in world exports of tuna. It is difficult to measure the precise trend but it could be 0.9 percent per year (taking account either of terminal years 1956 and 1965, and 1.1 percent per annum measuring from 1956-58 to 1963-65), or 1.0 percent per year (based on least squares regression). This would mean that world trade in canned tuna has just about kept pace with growth in world production and consumption.

Table 10 - Apparent World Consumption of Canned Tuna and Tunalike Fish, 1956-65<sup>1/</sup>

Year	E.E.C.	Portugal	Spain	U.K.	U.S.A.	Japan	Morocco	Rest of World	Total
					(1,000 Metric Tons)				
1956	55.1	2.1	18.5	6.0	137.9	35.4	0.3	47.0	302.3
1957	71.2	1.3	18.0	4.0	136.5	30.8	3.2	61.6	326.6
1958	42.6	0.6	18.5	2.8	148.8	23.4	0	21.2	257.9
1959	50.0	0.6	12.0	2.4	151.9	32.4	0	30.7	280.0
1960	65.0	1.8	12.6	2.1	157.6	23.0	0	36.9	299.0
1961	65.7	1.1	10.4	3.4	169.1	29.2	0	45.1	324.0
1962	71.4	1.6	14.2	2.7	178.5	19.5	0	34.1	322.0
1963	76.4	1.9	11.9	3.4	175.7	20.0	0	44.7	332.0
1964	76.9	3.4	12.9	3.9	182.5	15.9	0	39.5	335.0
1965	59.7	3.7	18.8	3.1	184.6	9.2	2.4	69.5	348.0

<sup>1/</sup>Excludes Eastern Europe and China (Mainland).  
Source: FAO Yearbook of Fishery Statistics.

Table 11 - Annual Weighted Average Price of All Types of Raw Tuna Ex-Vessel (California), 1956-65

Year	Dollars Per Ton	
		Deflated Price <sup>1/</sup>
1956	262	274
1957	257	261
1958	268	268
1959	255	255
1960	248	248
1961	264	264
1962	289	289
1963	251	252
1964	255	255
1965	264	259

<sup>1/</sup>Deflated by the U. S. Wholesale Price Index, 1964=100.  
Source: U. S. Department of Interior, BCF.

Table 12 - U. S. Wholesale Price of Canned Tuna, 1956-65

Year	Domestic Canned Tuna Price		Imported Canned Tuna Price <sup>2/</sup>	
		Deflated Price <sup>1/</sup>		Deflated Price <sup>1/</sup>
	(Dollars Per Ton)			
1956	1,103	1,152	n.a.	-
1957	1,127	1,144	n.a.	-
1958	1,163	1,164	n.a.	-
1959	1,087	1,086	n.a.	-
1960	1,102	1,100	883	881
1961	1,129	1,131	937	939
1962	1,202	1,201	1,009	1,008
1963	1,127	1,129	1,014	1,016
1964	1,381	1,381	1,238	1,238
1965	1,385	1,358	1,201	1,071

<sup>1/</sup>Deflated by the U. S. Wholesale Price Index, 1964=100.

<sup>2/</sup>Mostly Japanese tuna in brine.

Source: U. S. Department of Interior, BCF.

### U. S. Exports Virtually Nothing

Among individual exporters, U. S. exports declined from a high during the period of 7,900 tons in 1957 to virtually nothing in recent years, while some other major exporters, such as Peru, Portugal, and Spain, have shown stagnating or declining trends (Table 8). Japan is the only exporter to improve its position. Exports rose from 27-32 thousand tons early in the period to 40-42 thousand tons in recent years. In effect, Japan has not only preempted virtually all growth in the world export market since 1959, but she has also cut into its competitors' markets.

EEC, the U. S., and the U.K. imported just over 75 percent of total world imports (Table 9). Imports into U.K. have declined by about 45 percent from 1956, undoubtedly reflecting decline in demand. In the U. S., imports barely remained level despite growth in consumption. The growth in U. S. demand has been fed primarily through increased domestic production of canned tuna from imports of frozen tuna. Only in the "rest of the world" and in EEC have imports benefited from growing demand. In EEC, imports increased by 5,300 tons per year--from an average 12,000 tons per year in 1956-58 to 17,300 tons per year in 1963-65 (a 4.7 percent growth rate per year) while consumption grew by almost 15,000 tons per year (from 56,300 tons to 71,000 tons). Most growth in imports has been in the "rest of the world", which absorbs only about 25 to 30 percent of total exports (Tables 9 and 10).

Price data for tuna are extremely scarce and the reliability of some series is questionable. During 1956-65, annual weighted average price of all types of raw tuna, exvessel California, in real terms (deflated by U. S. Wholesale Price Index 1964=100), fluctuated between a minimum and maximum of \$248 to \$289. The decade average was \$263. The real price of canned tuna in the U. S. similarly has shown no decided trend; it has averaged \$1,185 per ton.

### CONCLUSION

On the whole, it appears that world landings of raw tuna and tunalike fish are likely to grow, but most of the growth is likely to take place in areas other than the U. S. In fact, U. S. landings in 1956-65 have risen by less than 1.2 percent per annum based on a least squares regression; in most recent years, they have stagnated.



Domestic consumption of raw tuna apparently is concentrated in less developed areas, except in Japan, and depends on domestic catch; that is, it is not supplied by international trade.

Some countries, EEC, Canada, and the U.S., for example, depend on frozen tuna for all or part of their canned production. This has resulted in increasing international trade in frozen tuna. However, it is not clear whether trend of this trade has been 8.7 percent per year (1956-65) or 5.3 percent per year (1958-65). The latter should not be ignored since it represents more recent years. Japan has the lion's share of the export trade; she is not expected to lose her lead. Since demand for

canned tuna in frozen-tuna-importing countries is increasing at 4.3 percent rate per annum in EEC, and 3.3 percent in the U. S., long-term rate of growth in demand for frozen tuna is likely to go no higher.

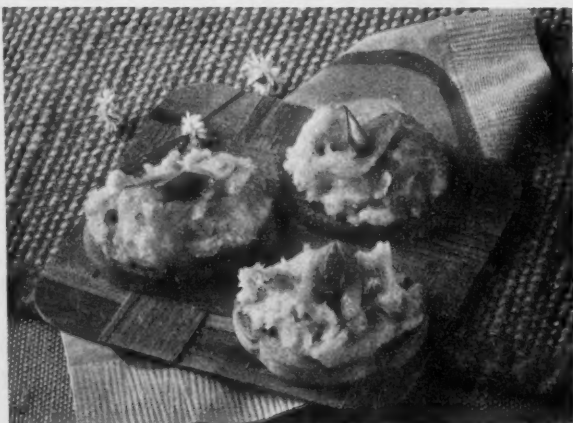
Consumption of canned tuna is rising only in the U.S. and EEC. However, there has been a tendency in these areas to meet domestic consumption needs from processing of frozen tuna, rather than by increased imports of canned tuna. This is reflected in very slow growth of canned tuna exports--0.9 percent per annum in 1956 to 1965, and 1.1 percent from 1956-58 to 1963-65, or 1.0 percent per year based on least squares regression.

Note: I am greatly indebted to W. H. Stolting of BCF for valuable comments on an earlier draft of the paper, and to M. M. Miller of BCF for assistance in collection and classification of data. No one (including my employer) is responsible for either the opinions expressed or possible errors and omissions.



### TUNA CHEESIES

- 1 can (6-1/2 or 7 ounces) tuna
- 1 cup shredded cheese
- 1/4 cup butter or margarine, softened
- 2 tablespoons lemon juice
- 1-1/3 tablespoons grated onion
- 1 teaspoon Worcestershire sauce
- 1/2 teaspoon paprika
- 3 drops liquid hot pepper
- 30 melba toast rounds



Drain and flake tuna. Cream the cheese and butter. Add seasonings and tuna. Mix thoroughly. Spread each toast round with approximately 2 teaspoonfuls of tuna

mixture. Place on a baking pan, 15 by 10 by 1 inch. Broil about 4 inches from source of heat for 3 to 5 minutes or until lightly browned. Makes approximately 30 canapes.

This idea for entertaining is from a 22-page, full-color booklet, "Nautical Notions for Nibbling," by the United States Department of the Interior's Bureau of Commercial Fisheries. It is available for 45 cents from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Ask for Market Development Series No. 10 (catalog no. I-49.49/2:10).



## TWO LEGS OF "OCEANOGRAPHER'S" GLOBAL CRUISE

By Dr. Timothy Joyner\* and Robert C. Clark\*\*

On Dec. 11, 1967, the globe-circling U. S. oceanographic survey vessel "Oceanographer" returned to her home port of Seattle, Wash., after an 8-month, 37,000-mile scientific expedition. Representatives of 17 foreign nations participated. The 303-foot, 3,800-ton, gleaming white "floating laboratory" belongs to the U. S. Coast and Geodetic Survey.

The authors, oceanographers, represented BCF on two legs of the cruise. As geochemists, their primary mission was to evaluate the chemical properties of the water masses in the Tasman Sea and the Southern Pacific Ocean. A secondary mission was to investigate the survival of Pacific salmon transplanted experimentally to the Southern Hemisphere in the early years of this century by the old Bureau of Fisheries, a precursor of the present Bureau of Commercial Fisheries.

Below are parts of the report on their trip, which ran from Sept. 10-Nov. 14--Ed.

\*\*\*\*\*

We flew to Sydney to join the Oceanographer. A highlight of our stay in Sydney was a visit to the Division of Fisheries and Oceanography, Commonwealth Scientific and Industrial Organization, in Cronulla, a suburb. The staff was gracious. Brian Newell, a marine chemist specializing in nutrient chemistry, briefed us on the history of fishery development in Australia:

**Trawl Fisheries:** These began in southeastern waters about 1915, the year following government-sponsored exploratory fishing. Years of high production were followed by a sharp decline. Steam trawlers were taken out of service in 1958-59. The fishery is currently stabilized at a low level of production; otter and Danish seine trawling predominate.

**Tuna Fishery:** In 1937, a cannery was established in Narooma, New South Wales, to exploit the occurrence of southern bluefin revealed by aerial surveys. The landings were insignificant. The actual development of the

Australian tuna fishery followed the visit of 2 American tuna experts in 1954. In 1965, the use of gill nets, long lines and purse seines was introduced.

**Crayfish:** For many decades this was a small-scale operation centered on the southeast coast. In 1944, the western coast began to develop into what has since become Australia's most productive single fishery. The U.S. market for frozen crayfish developed in 1948-1953. The years 1954-62 saw the introduction of more powerful vessels, conservation methods designed to maximize the sustained yield, and better processing facilities.



Fig. 1 - Cray fishing vessel with Maori-type pots in Wellington, New Zealand.

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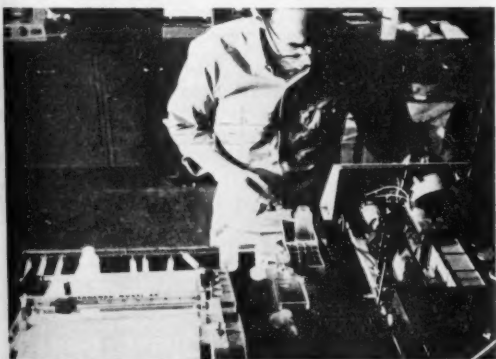
\*\*Oceanographer, BCF Biological Laboratory, Seattle, Wash. 98102.

**Prawns:** In 1947, deep-sea prawning started off the east coast of New South Wales. The fishery is based on off-shore spawning. Since 1962, an extensive prawn fishery has developed off Western Australia.

**Molluscs: Oysters (*Crassostrea commercialis*)** are produced in all states except South Australia. In the estuaries of New South Wales and, to a lesser extent, Queensland, oyster culture is being developed. Oyster production has not kept pace with domestic demand, and imports are still necessary. In the Botany Bay estuaries, where raft culture of oysters is being developed, the range of water temperatures is from 24° C. in the summer to 16° C. in the winter.

Sydney to Wellington

Our objective for this leg of the cruise was to evaluate the chemical properties of the water masses contributing to the circulation patterns of the Tasman Sea. Instrumentation,



Figs. 2A & 2B - BCF geochemistry on OSS Oceanographer.

reagents, and laboratory ware were installed in the ship's oceanographic laboratory to provide capability for the following kinds of chemical processing and analysis at sea: Atomic absorption and emission flame photometry for analysis of alkali and alkaline earth elements; Spectrophotometric analysis of Cu, Zn, Fe and carbohydrates; pH measurement; Selective preconcentration of heavy-metal trace elements from sea water.

Shipboard facilities and the cooperation of the scientific staff, officers, and crew were excellent.

Sampling data, preconcentration processing and analyses were performed at sea. Heavy-metal concentrates were returned to Seattle for analysis.

In Wellington, we had the good fortune to contact Ron Little, Supervisory Fishery Scientist for the Marine Department. He is a Californian, a former BCF employee, and is in charge of his department's current effort to evaluate the extent of the Quinnsat (chinook) salmon resource on South Island. These fish were planted in New Zealand near the turn of the century from eggs of Sacramento River (California) chinook stock. These fish have survived in a number of streams and rivers of the southeastern, southern, and southwestern coasts of South Island. The government has built a fish trap on the Glenariffe tributary of the Rakaia River to evaluate the extent of the incoming and outgoing migrations. At present, virtually nothing is known of the populations of Quinnsat salmon in New Zealand streams.

The Glenariffe trap is located in the foothills of the eastern slopes of the Southern Alps, about 80 miles from Christchurch, South Island.



Fig. 3 - Salmon trap in Rakaia River, South Island, New Zealand.

The bed of the river is a maze of braided channels which continually shift, creating serious hazards for egg survival. Spring flooding and predation by birds are additional obstacles to survival of the newly hatched fry. The returning adults appear to be predominantly 3-year-olds and average 6-10 pounds in weight. The young migrate early, at about 3 months, when they are only a few inches long. Little is known of their ocean behavior. There is a convergence of tropical with cold water off the east coast of South Island, so it is likely that their ocean movements are confined to the Southern Shelf region. Ron Little is anxious to try some additional transplanting experiments and may ask BCF for a shipment of chinook eggs in 1968. The relations between the Marine Department and sports fishing interests are not always as cordial as they might be. There has been a surprising amount of opposition by sportsmen to any sort of government control over the salmon stocks.

#### Wellington to Valparaiso

This leg of the cruise was primarily geological--with emphasis on elucidation of various characteristics of the sea bottom-topography, strength of materials, sedimentology, minerology, and gravitational and magnetic phenomena.

The chemical analyses of sea water begun on the Sydney-Wellington leg were continued.

With the assistance of the superb facilities of the ship's oceanographic laboratory, we were able to collect, process, and analyze samples almost continuously along the entire track from Australia to Chile. The cruise demonstrated the feasibility of operating an integrated instrumental system for elemental analysis of sea water aboard ship. We were able to optimize the precision, range, and sensitivity of our analyses by choosing, for a given set of analytical conditions, the most applicable of the techniques of molecular absorption, flame emission, and atomic absorption spectrophotometry.

Working alongside the geologists on the Wellington-Valparaiso leg gave us the opportunity to become acquainted with their techniques. The experience suggested possible adaptations of these techniques to provide information useful in assessing water mass and (possibly) fish distribution in the North Pacific. Closely contoured maps of bottom topography and geomorphology, prepared with the help of high-

resolution echo sounding, should be most helpful in predicting flow patterns along the floor of the shelf areas. Coring techniques could be adapted to study distribution and relative age of hard parts of fish found in the upper sediment layers. This would prove useful in working out the history of the geographic distribution of fish populations (as in the case of the California sardine).

#### Supplementary Work

In addition to our oceanographic work during the cruise, the time spent in Australia, New Zealand, and Chile gave us the opportunity to do two other things: We extended our investigations to include terrestrial and coastal waters in which both mixing and separation processes bring about the distinctive chemistry that constitutes a significant feature of the near-shore environment. And, to a limited extent, we communicated with fishery officials and observed some facets of fishery-based activities.

#### Chile

The Division of Fisheries of the Chilean Ministry of Agriculture had assigned Senora Irma Vila, P., a biologist, to assist us as a guide, interpreter, and informant. Arrangements were made for us to visit and obtain water samples from the Strait of Magellan, the shellfish culture stations on the Island of Chiloe in the Gulf of Ancud, and Lake Llanquihue near Puerto Montt.

#### Water From Strait of Magellan

On November 2, accompanied by Senora Vila, we were flown by Lan-Chile Airlines to Punta Arenas, a clean, busy, free-port city of 35,000 at the southern tip of South America on the Strait of Magellan (53°S). Comfortable accommodations were provided at a "hosteria" maintained by the Ministry of Agriculture several miles outside the city. We obtained and processed a sample of water from the Strait of Magellan from a beach across the road from the hosteria.



Fig. 4 - Strait of Magellan--obtaining a water sample.

Before leaving Punta Arenas, we visited Senor Guillermo Roehrs, president of the sport fishing club, owner of a hardware and fishing tackle shop, a long-time resident, and a fishing enthusiast. He is well known and respected by Chilean fish and game authorities and appeared to be familiar with the taxonomy of the sport fishes of the area, including the salmonids. He assured us that the fish called salmon by the local sportsmen were not of the genus *Onchorhynchus*--but were sea-run trout *Salvelinus fontinalis* and *Salmo trutta*, the former commonly reaching 10 kilos. These sea-run trout have silvery scales and bright red flesh and are eagerly sought by sportsmen. These trout are caught in substantial numbers in Seno Otway and Seno Skyring, two wide fjords with narrow openings to the Pacific Ocean and interconnected by a narrow channel. Local maps show that many small, year-round streams flow into these protected, salt-water inlets, which appear to be well suited as an environment for salmonid fishes. The sea temperatures range from 6°-12° C. year round.



Fig. 5 - Fish market at Angelmo, Chile. Dried fish, sea-urchins, clams, abalone, conger eel, dried mussels.

We left Punta Arenas on November 3 for Puerto Montt. On November 4, we visited the fish market at Angelmo, the fishing and shipping port for Puerto Montt. We were struck by the predominance of shellfish in the fish market. Several kinds of mussels, smoked and hung on strings, were evident everywhere in large numbers. Also displayed were clams, oysters, huge barnacles, abalones, and sea urchins. Most of the fish displayed (eels, mackerel, and groundfish) were caught by hand-line fishermen working from oar-propelled open boats close inshore. There were very few motorized fishing vessels evident. A large number of small sailboats, 15 to 75 feet long, were beached at low tide, some had auxiliary power. They are not generally used for fishing but for carrying cargo to the island of Chiloe, a few miles across the gulf. We saw women gathering kelp at low tide and were told that it is sold and used for food. There is little transport and storage of fishery products of this region; most is sold fresh or smoked in local markets.

On November 5, we traveled by bus and ferry to Castro, on the island of Chiloe, where we obtained a water sample at the head of the Fierdo Castro which opens into the Gulf of Ancud.

#### Oyster Culture at Pullinque

On November 6, we traveled by bus to Ancud, at the northern end of Chiloe. Here we were met by a boat from the oyster-culture station at Pullinque, in the Golfito (Little Gulf) de Quetalmahue, about 10 kilometers by water from Ancud. This station encompasses farm buildings and waterfront acreage with a small boat pier; it appears to be a model of progressive, scientific management. The barn has been converted into a well-equipped wood-working and machine shop. There is a power plant, a small laboratory building containing diving gear and a wet-lab, and a residence.

In the culture operation, mussel shells are strung on strings, spaced about 6" apart with spacers of polyethylene tubing. These strings are suspended from rails fastened horizontally to stakes which are pounded into the shallow bottom of the bay. The spat attach to the mussel shells, especially to the concave side which faces downward, and are thus protected from sedimentary fallout by the "umbrella" action of the mussel shell. Dr. Sergio Basulto d.C., Chief, Section of Biological Studies of the Division of Fisheries, has studied oyster culture in Aomori, Japan. The methods used at





Fig. 6 - Oyster culture at Pullinque, Island of Chiloe, Chile.

Pullinque are based on Japanese techniques modified for conditions in Chile. The temperature of the water in the Golfo de Quetalmahue was  $14.2^{\circ}\text{C}$ . when we took our sample there. The annual range is narrow, as the climate is quite uniform. Salinity at the oyster station averages about 26-27 with a range of 20-29 parts per thousand. The oysters, classified *Ostrea chilensis*, tasted somewhat strong, similar to Australian rock oysters. The government makes seed available to private individuals to encourage development of private oyster farms. We were told that it is the same with the mussel culture (in which Spanish techniques are being used).

We went to Puerto Montt on November 7. We took a short bus ride to Puerto Varas on Lake Llanquihue, where we obtained a water sample. The lake collects drainage from the western slopes of the Andes. It is the largest and southernmost in Chile's famed Lake District.

#### Salmon Eggs from U. S.

On November 8, we went to the Rio Blanco Fish Hatchery, Chile's oldest (1905), about 80 km. from Santiago, 9,000 feet up in the Andes,

and not far from Portillo. It was at this hatchery that the salmon eggs transported from the United States early in the century were hatched. The hatchery is one of four in the country. It is used principally for the culture of brown trout, which are planted in lakes to stimulate the sport fishery. Rio Blanco, in a beautiful setting similar to the High Sierras of California, is a clean and well-run hatchery. The troughs and concrete ponds are scrubbed, the egg baskets well picked, and the trout food is well prepared and nicely pelletized. It appears to be very well managed.

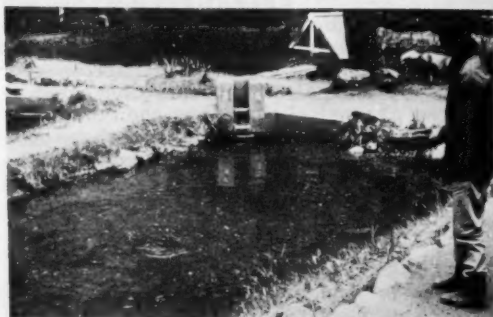


Fig. 7 - Earthen rearing pond, Rio Blanco hatchery, Chile.

#### Observations on Visit to Chile

1. There do not seem to be any Pacific salmon surviving in Chile from early-century transplant experiments. However, the southern third of the country (Aysen and Magallanes) should have potential as a favorable environment for the culture of salmonid fishes, including Pacific salmon.

2. The Centolla crab industry of southern Chile appears to be capable of sustaining an enlarged fishery. Exploratory fishing investigations are sorely needed to define the magnitude and extent of this resource. The present fleet of boats engaged in this fishery is inadequate for anything more than marginal operations close inshore and in favorable weather.

3. The deeply indented coastline of Aysen and Magallanes is washed by the cold, nutrient-rich waters of the Humboldt current. It would appear well-suited for shellfish culture, pisciculture, and small-boat, inshore fisheries. However, lack of adequate transport, shore facilities, local markets and, above all, of people oriented toward the sea and maritime



trades, impose severe restrictions on developing these potential marine resources.

4. The culture of trout as game fish is a well-established, well-managed, successful operation. Four trout hatcheries are operated by the government for stocking lakes and streams in the central part of the country. There seems to be a good measure of rapport between the sports fishing organizations and the Ministry of Agriculture's Division of Fisheries.

Dr. Basulto is now eager to undertake an attempt to transplant Pacific salmon to the Aysen-Magallanes region. The Division of Fisheries is particularly interested in sending some scientists and technicians to the U. S. Pacific Northwest for observation and training in salmon culture techniques. The Division also is interested in getting the assistance of some American salmon hatchery men for locating and planning their transplant experiments.



#### UNDERSEA WARFARE

Underwater gadgets of the future should resist attack by sea organisms better than their predecessors. Thanks to research stimulated by the rapid growth of oceanography, the marine biological environment is now beginning to be understood. Laying the first trans-Atlantic telephone cable in 1956 highlighted the need to develop better ways to prevent undersea damage. Since then, extensive testing of sample materials to be used in underwater marine applications has continued. Results appear in materials now used for recently established submarine listening and tracking stations, and work on long-term protection of marine equipment will continue as more massive underwater equipment is installed.

Early submarine cables were insulated with gutta percha, a natural rubber-like substance, and then covered with hemp, but mollusks and borers were quite successful in destroying them. Mollusks and crustaceans are the most destructive of marine organisms. The 1956 cable has a barrier of copper sheeting wound helically around its internal structure. The latest cables, however, are insulated and covered with polyethylene, which resists most of the marine borers even more effectively, and outer coverings are now black, so as not to attract fish that often bite through light-colored cables.

Fouling is another severe problem. Underwater equipment, particularly that used for communications, must remain reasonably clean in order to operate efficiently, but once a surface is wet, micro-organisms produce a slimy film on it, and very soon afterwards macro-organisms such as barnacles attach themselves to the slime. Protective paints have been developed, and some of them are quite effective in warding off micro-organisms. Effectiveness is related to surface texture, wetting characteristics and stability of the material, relative movement of water around it, and amount of light available; micro-organisms grow faster in warm, lighted water than in cooler deeps.

Compounds of copper, mercury and arsenic that are toxic to fouling organisms have been successfully incorporated in paints for use on hulls. But now that plastics and fibrous glass have become popular in boat hulls, particularly in pleasure craft, there is need for anti-fouling compounds that can be mixed with them to produce a similar effect. Another technique to prevent fouling has been developed recently; it involves pumping a solution of the toxic substance from perforated pipe-lines attached to the underwater area of the ship or structure to be protected. In some cases, this system is used in conjunction with cathodic protection, an electrical anti-fouling procedure which has already proved effective.

Thanks to recent developments, underwater military programs now have a wide range of new and improved materials available. For example, a deep-water basin in the Bahamas, called the Tongue of the Ocean, was chosen as the site for a manned submarine weapons evaluation center; planning for this Atlantic Underwater Tracking and Evaluation Center (AUTEC) would be much easier if we had even better protection against destruction by undersea life. (Abstracted from "Industrial Bulletin," Arthur D. Little, Inc.)

# INTERNATIONAL

## UN'S Caribbean Vessels Are Active

The 3 vessels connected with the UN/FAO Caribbean Fishery Development Project were active during December 1967. The "Alcyon" conducted bait fishing and scouting for skipjack tuna schools while sailing around Jamaica. Although live bait was available in good quantities, there was little evidence of schooling skipjack or other tuna.

The "Calamar" worked with trawl gear off the north and east coasts of Trinidad, the mouth of the Orinoco River, and the western extremity of Guyana. Fishing off Trinidad's north coast presented new challenges to the crew because strong currents and rough bottom caused gear problems not encountered on the comparatively good grounds off the Guyanas. Although the trip was primarily exploratory, over 4 tons of good food fish (including moonshine and nice snappers) were landed at Port-of-Spain.

The "Fregata" sailed to Curacao in early December. She was scheduled to operate from there until February or March 1968. En route, a large school of skipjack tuna was observed north of Tortuga Island, Venezuela. Several were hooked on troll gear. Limited activities after arrival included light and lift-net fishing for bait--hampered by a full moon.



## ICES Convention Likely to Enter Into Force July 1968

Italy has "unofficially" ratified the new ICES (International Council for the Exploration of the Sea) Convention. She is the last of 16 signatory nations. ICES entry into force on July 22, 1968, is expected. No formal announcement has yet been made because there is some question over whether Italy submitted her ratification in proper form. No problem is expected, however. (Asst. Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Jan. 5, 1968.)



## Finland Studies OECD Membership

Finland has begun a study of the implications of full membership in the Organization for Economic Cooperation and Development, OECD, including the various possibilities and terms of membership. She was expected to begin informal discussions with the OECD secretariat sometime in January 1968. (U. S. Embassy, Helsinki, Jan. 5, 1968.)



## 1967 Eastern Tropical Pacific Tuna Catch Sets Record

The 1967 combined catch of yellowfin and skipjack tuna in the eastern tropical Pacific has been estimated by the Inter-American Tropical Tuna Commission (IATTC) as 222,000 short tons. This is the greatest combined catch of the 2 species in the Commission's regulatory area.

Based on preliminary figures, IATTC estimated the 1967 yellowfin tuna catch at about 90,000 short tons--about 6 percent above the catch quota of 84,500 tons.

The estimated 1967 skipjack catch was a record 132,000 short tons--more than double 1966's.



# FOREIGN

## CANADA

### 1967 BRITISH COLUMBIA SALMON PACK EQUALS U. S. PACK

The British Columbia (B.C.) salmon pack this season equaled the U. S. pack with 1.46 million cases (48 lbs. per case). For the U. S., it was a disastrous year, the smallest pack since 1899, and down 63 percent from 1966. The B. C. pack was also off from 1966, 20 percent or 350,000 cases, but it was still the second best year since 1962.

percent above 1966--yet the gross value was C\$26.8 million, only 1 percent over 1966. Meanwhile, the cost of producing fish has increased steadily, leaving the industry depressed.

Leaders of the frozen-fish industry claim the current price allows no profit.

#### Landings of Important Species

Landings of various species in millions of pounds were: cod, 313; lobster, 3; salmon,

B. C. Canned Salmon Pack, 1962-1967

Species	1967	1/1966	1/1965	1964	1963	1962
(Standard Cases--48 1-Lb. Cans) . . . . .						
Sockeye . . . . .	558,910	407,949	245,798	343,359	158,375	297,717
King . . . . .	14,962	14,585	18,891	9,127	10,000	7,174
Steelhead . . . . .	1,294	2,480	843	1,262	771	815
Blueback . . . . .	7,798	21,087	21,300	36,259	11,384	12,097
Coho . . . . .	138,869	260,536	273,984	168,473	146,099	175,638
Pink . . . . .	650,460	951,794	287,925	464,107	757,452	1,188,661
Chum . . . . .	93,995	160,784	65,216	232,721	119,190	134,483
Total . . . . .	1,466,288	1,819,215	913,957	1,255,308	1,203,271	1,816,585

1/Revised.

Source: Canadian Department of Fisheries.

Pink and sockeye salmon dominated the Canadian pack and accounted for all but about 200,000 cases of the total. Red salmon was the U. S. leader, followed by pinks and chums. U. S. totals for reds, coho, and chum were off about 50 percent, while pink salmon was about one-sixth the 1966 pack. B. C. packs for individual species were down for all except sockeye, which were up 150,000 cases, and king, up 400 cases. (B. C. Canned Salmon Pack Bulletin, Dec. 2, 1967, and Alaska Salmon Report 13, Dec. 1.)

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#### THE NEWFOUNDLAND FISHING INDUSTRY IN 1967

A trend was reversed for the first time in several years: the salted cod business increased and the frozen groundfish business decreased. It was caused by a downturn in the U. S. frozen fish market and a good market for salt cod.

The Province's fishermen made a record catch in 1967--746 million pounds, nearly 10

3.9; turbot (Greenland halibut), 31.7; capelin, 7.7; squid, 11.2; and 42,070 seals. Fish meal production totaled 17,600 short tons; fish oil, 2 million gallons.

The Frozen Fish Trades Association plans, with Provincial Government help, to contest the constitutionality of an Oregon State law forbidding sale of "Greenland halibut" in Oregon.

#### Frozen Groundfish Production Declines

Frozen groundfish production in 1967 was 104 million pounds, the first decrease in 11 years. Local speculation is that lower prices for frozen fish produced a cutback in production everywhere--causing a reduction in world supply of frozen cod blocks, which may strengthen price eventually. However, this tendency will be offset in the U. S. by increased pressure on the market because Denmark's devaluation will put Danish and Greenland fish in heavy competition. Also, Iceland fish will be another strong competitor for the U. S. market. Normal Canadian imports into the United Kingdom will be off.

## Canada (Contd.):

This will depress U. S. market further as Canadians attempt to sell relatively more in the U. S.

### The Fleet

In 1967, 20,290 fishermen, including 12,300 full-time fishermen, were employed. The fleet consisted of 10,690 motor vessels; 5,300 nonmotorized boats; 248 long-liners under 25 tons, 38 long-liners over 25 tons, 64 trawlers, and 8 small inshore draggers. (Canadian Federal Fisheries Department.)

### Problems Ahead

Newfoundland was on a "cod economy" for generations. Fishing will continue to be important to its economy. However, the trend is toward modern equipment and techniques and mass production. This means that fewer people will be employed in the industry and marginal producers will be forced out. (U.S. Consulate, St. John's, Jan. 8, 1968.)

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### NO WHALING THIS YEAR

The Western Canada Whaling Co., the only Canadian whalers in the Pacific, will not operate its fleet of 5 ships in 1968 for economic reasons. The company will study the situation again next fall. It operates a whaling station at Coal Harbor in Quatsino Sound.



There was less demand for whale meat as mink feed. Improved Japanese living standards meant less demand for the meat as a food for people. The oil market also was down. The 1967 catch was poor. It consisted chiefly of sperm whales, the least valuable.

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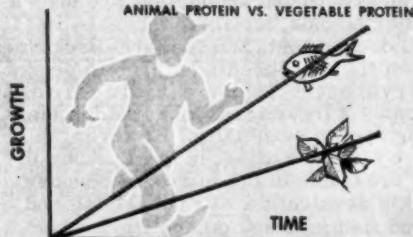
### BRITISH COLUMBIA HERRING FISHING STOPS

The British Columbia (B. C.) herring fishery ended on Oct. 29, 1967, and was scheduled to remain inoperative until Jan. 7, 1968, as fishermen and fish companies joined in asking the Canadian Government to close the herring fishery for conservation purposes. The total catch through October 7 was one-third less than last year's 47,000 short tons.

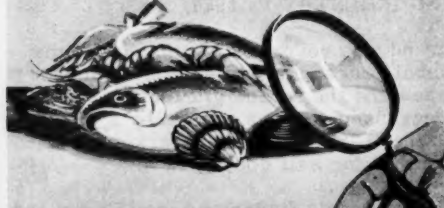
Fishermen are rejecting the recent cut in exvessel prices, which are negotiated by contract. Unemployment in the industry has prompted proposals to alleviate fishermen's difficulties. The proposals include direct subsidies and hiring of fishermen by the Federal Government for conservation and research work. Herring fishermen, primarily due to strikes, have not worked a full season since 1951. (U. S. Consulate, Vancouver, Dec. 1, 1967.)

### HIGH GROWTH FACTOR

ANIMAL PROTEIN VS. VEGETABLE PROTEIN



WHAT ELSE? WELL...  
LET'S TAKE A GOOD CLOSE  
LOOK...



## EUROPE

### USSR

#### 1967 CATCH OFF U. S. PACIFIC COAST WAS NEAR 200,000 TONS

In 1967, the Soviet Union landed an estimated 200,000 metric tons of fish off the U. S. Pacific coast: about 120,000 tons off Washington and Oregon, over 70,000 tons off California. In addition, about 20,000 tons were taken off Mexico. The total 1967 Soviet catch from Washington to about the tip of Baja California was about 210,000 metric tons. These data are based on preliminary Soviet catch figures for the first 11 months.

#### Smaller Than 1966 Catches

The catch off Oregon and Washington was composed of Pacific hake, about 112,500 tons, and Pacific ocean perch, about 7,500 tons. Both catches are below 1966's, when 128,259 metric tons of hake and an estimated 10,000 tons of ocean perch were landed. A precise figure for 1966 ocean perch catch off Washington and Oregon is not yet available because the Soviets report their total Pacific ocean perch catch as one figure; they do not break it down by specific areas. More detailed data by areas may be available in 1968, when U. S. and USSR fishery experts meet again to discuss Pacific cooperative research programs.

Precise catch by species off the State of California is not known. It is estimated that over half the total, about 40-50,000 tons, was hake, and the rest rockfish species.

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#### BUILDS MODIFIED FLOATING CANNERY

Several years ago, the Soviets began building the "Zakharov" class 12,600-gross-ton floating canneries in the Admiralty Shipyards at Leningrad. Most of the vessels were delivered to the Far Eastern Fisheries Administration. They were first used in the king crab fishery and later also in herring, saury, and other northwestern Pacific fisheries. In Dec. 1966, this class was used for the first time in shrimp processing off the Shumagin Islands.

Now the same shipyard has begun building a modified version. The gross tonnage is the same but the processing capacity is increased substantially. Instead of 200,000 cans a day, the modified "Zakharov" cannery is capable of packing 300,000 cans of herring or 180,000 cans of tuna. Another innovation is the capability of producing fish paste and equipment to freeze both cooked and raw shrimp. A fish meal and oil plant is included in both the old and new versions.

The new type, the "Korablestroitel Khlopotov," was finished on Sept. 15, 1967. In November she sailed from the Baltic towards Vladivostok, her home port.

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#### FISH CULTURE IN POWER-PLANT-WARMED WATERS

In early 1966, an editorial in the Soviet fishery journal "Voprosy Ikhtiologii" discussed implementation of directives issued to fishery scientists by the 23rd Congress of the Soviet Communist Party. The editorial noted that in the next 5 years the number of thermal electric power plants would rise greatly. The Ministry of Fisheries should plan to use these warm waters for fish culture--even to "change the regime of rivers into which thermal waters flow."

By May 1967, a decision was made to begin experimental work at the Konakovo Thermal Electric Plant (in Upper Volga region). Cooling waters of the plant were to discharge into a pond to be built nearby. Ponds would not freeze in the winter, an important consideration in the more northern latitudes of the USSR. The results are not known, but the experiment must have been highly successful because, by October 1967, the Ministry of Fisheries decided to begin constructing the first large-scale pond complex fed by thermal waters.

#### Site Selected

The site selected is about 50 kilometers from the giant Novochoerkassk Thermal Electric Plant (on the Don River not far from its mouth). A canal will be built to supply warm



## USSR (Contd.):

waters to 133 ponds encompassing about 3,500 hectares (actual pond area is unknown). An incubation hatchery will produce fingerlings from fish eggs; a plant to produce granulated "fish fodder" is also being built at the site. Expected annual production of the 133 ponds is 6,100 metric tons of fish a year.

There was no mention of cost. However, since profit is of prime importance under the newly introduced economic reforms, it is assumed that the thermal fish ponds will be a paying proposition. Construction of the complex began in early fall 1967. It is not known when it will be finished.

\* \* \*

ORDERS NEW STERN TRAWLERS  
FROM DENMARK

In December 1967, the Soviet's vessel-importing agency, "Sudoimport" of Moscow, contracted with Burmeister & Wain Shipyards of Copenhagen for 6 large stern freezer trawlers. The 4,600-gross-ton vessels will be similar to other freezer trawlers built by the same shipyard for the Soviet fleet over the past 5 years. There is one significant difference: 3 of the newly ordered vessels will accommodate 75 fishermen-trainees. (U. S. Embassy, Copenhagen, Jan. 5, 1967.)

By April 1967, the Copenhagen shipyard had built about 40 fishery vessels for the Soviets with a total tonnage of about 200,000 gross tons. The 1964 cost of the "Skryplev"-class vessels was about US\$3.3 million per vessel.

## Much Progress in Fishermen Education

The Soviet Ministry of Fisheries has made great progress in fishermen's education. It is only slightly behind similar West European schools in quality and second to none in quantity. One problem is how to give fishermen apprentices actual experience on the high seas. Several training vessels are available for training in navigation, but fishing experience is obtained mostly on commercial vessels.

\* \* \*

## NORTH SEA HERRING STUDIED

Soviet fishery scientists from the Polar Research Institute for Fisheries and Oceanography conducted exploratory stern trawling in the Norwegian Sea. Their purpose was to study stocks of adult herring in winter habitat. The study was headed by O. M. Kiselev, Director of the Institute's Laboratory for Underwater Research Techniques. ("Pravda," Dec. 8, 1967.)

The scientific cruise was due in part to poor Soviet fishing in the Norwegian Sea during fall and winter 1967. This was apparently caused by bad weather and possibly other factors. Scarcity of herring in the North Atlantic lately has been worrying the Soviets, the Poles, East Germans, and other North Atlantic fishermen. The Soviet Western Fisheries Administration reacted to this situation late in 1967 by switching about 100 Baltic Sea-based vessels to the North Sea and the Skagerrak Straits. Soviet fishermen have not fished there for over 2 years.

## Seek Cooperation With Danes

The Commander of the Skaggerak Soviet fishing fleet told port authorities at Skagen, northernmost Danish fishing port, that he wanted to "exchange information on midwater trawling." The Soviets were especially interested in pair-trawling. The Fishermen's Association in Skagen proposed that the Soviets come into port, but the commander replied that there was no time for that. A Danish cutter was reportedly scheduled to meet with Soviet fishermen in the Kattegat. (Regional Attaché, U. S. Embassy, Copenhagen, Jan. 5, 1968, and other sources.)

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WESTERN PACIFIC SALMON  
STOCKS STABILIZE

Western Pacific humpback salmon stocks have stabilized, Soviet ichthyologists believe. This is based on recent studies in spawning areas on the Sakhalin and Kuril Islands. Only a few years ago, the fast-growing and wide-ranging humpback salmon found in rivers of only a few years ago, the fast-growing and wide-ranging humpback salmon found in rivers of the Soviet Far East was "on the verge of extinction." The Government took drastic steps

## USSR (Contd.):

160 rivers and 80 lakes in the Far East. It banned discharge of industrial waste into salmon spawning rivers. A vast hatchery program was established (over 30 salmon hatcheries produced billions of incubated salmon eggs).

## Millions of Fingerlings Released

In late 1967, over 600 million salmon fingerlings were ready to be released into the Pacific from Sakhalin hatcheries alone. Also, millions of salmon eggs were flown from Pacific hatcheries to Barents, White, and Caspian Sea biological stations for transplanting into those waters. ("Tass," various press releases.)

The research was done by the All-Union and Pacific Fishery Research Institutes. Canned salmon for years has been a primary earner of hard foreign currencies, a factor influencing Soviet efforts.

\* \* \*

## HARVESTS MORE N. PACIFIC FUR SEALS IN 1967

Fur-seal herds on the Soviet islands in northwestern Pacific are growing rapidly. Their number is approaching an optimum level, Soviet scientists believe. As result, the 1967 fur-seal harvest by the USSR was larger than in 1966. ("Tass," Oct. 11, 1967.) The Soviets give two principal reasons for this: the International Fur Seal Convention, which prohibits pelagic open sea sealing, and Soviet conservation and propagation efforts.

## Gives Skins to Canada and Japan

The Soviets give Japan and Canada 15 percent of their annual harvest. In 1966, this was 2,777 skins for each country out of a Soviet harvest of 18,514 skins. The USSR did not start giving Japan and Canada any skins until 1964, when the Protocol to the Convention specified that each country would receive 1,500 skins. In 1966, Japan and Canada demanded and received the 15 percent. They also get that percentage from the U. S. harvest. In return, they abstain from pelagic sealing.

## USSR Supports Convention

The Soviet Union supports the continuance of the International Fur Seal Convention, which she signed in 1957 along with the U. S., Japan,

and Canada. Statement of support was issued in Moscow from the Soviet Ministry of Fisheries in September 1967. They credited the Fur Seal Convention with helping to save fur seals from "virtual extinction" and call for "guarantees for a long life" of the Convention.

## History of Convention

The Fur Seal Convention originally was signed in 1911, but in October 1941 Japan withdrew. In 1957, after 18 months of negotiations, a 6-year Interim Convention was agreed on. During those 6 years, scientists were to determine the necessity of fur-seal management and conservation--and whether pelagic sealing should be permitted. In 1963, the Interim Convention was extended until 1969. Throughout the negotiations leading to the Interim Convention, the Japanese maintained that fur seals consume large stocks of fish and that it had not been demonstrated that pelagic sealing was unduly harmful. The U. S., USSR, and Canada maintained that the need for fur-seal conservation was evident and that pelagic sealing is less desirable than harvesting fur seals on land. The USSR might press for a permanent convention in 1969.

## NEW RUSSIAN-ENGLISH DICTIONARY OF FISHERY TERMS

Published by the U. S. Department of Commerce, Joint Publications Research Service. It is a translation of Russian-language dictionary compiled by A. A. Klykov, "Kratkiy Slovar' Rybatskikh Promyslovnykh Sloz" (Short Dictionary of Commercial Fishery Terms), published by Food Industry Publishing House, Moscow, 1959. The translation has been edited and revised by Dr. W. E. Ricker, Chief Scientist, Fisheries Research Board of Canada, Biological Station, Nanaimo, B.C. It has 67 pages and includes a bibliography reference index. It will help scientists and others interested in Soviet fishery literature.

The dictionary is available from Joint Publications Research Service, Adams Drive, 4th and 6th Streets, S. W., Washington, D.C. 20443, as JPRS translation 44,072; \$3.00 per copy.

## East Germany

### USSR REJECTS POORLY MADE TRAWLERS

A Soviet Commission has refused temporarily to accept large stern freezer trawlers of the "Atlantik" class ordered from the East German People's Shipyards at Stralsund. One reason is poor quality of the Diesel main engines, manufactured in the heavy machinery plant at Magdeburg. ("Neues Deutschland," Oct. 18, 1967.)

The East German newspaper charged that the main reason for the poor quality of the engines was the plant's bad management and failures in "ideological" work. The manager was charged with "mediocrity and self-complacency."

The Soviets have ordered over 100 vessels of this class. They were to replace "Tropik" class vessels also constructed at Stralsund.

#### First Tropiks Troublesome

The Soviets have had considerable trouble with the first Tropik class vessels. The second of these, the "Tukan," sank suddenly in the Skaggerak Strait off the Danish coast in early 1967 with a loss of 57 lives. If Soviet investigation revealed the sinking connected with design or construction work, they would scrutinize construction details of similar class vessels by the same shipyards.

The delivery to Denmark of smaller side trawlers built in another East German shipyard presented no problems. See CFR, Jan. 1968, p. 53.

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### EXPANDED ATLANTIC FISHERIES IN 1967

In 1967, East Germany expanded its fisheries into the southwestern Atlantic, mid-Atlantic, and Georges Bank. By early January 1968, over 2,000 East Germans were fishing on those grounds. This expansion has been aided by the Soviets, who gave the East Germans fishing experience data for those areas. The Soviets also trained them in purse-seining. In 1968, for the first time, 13 East German trawlers will be using this method in new fishing areas. This will make it possible to increase significantly the catch

per unit of effort--and give them a greater choice of fishing grounds. It will help avoid difficulties encountered in 1967. ("Neues Deutschland," Jan. 2, 1968.)

#### E. Germany No. 3 Builder

Surpassed only by Japan and Poland in 1966, East Germany built 32,500 gross tons of fishing and support vessels, or about 14 percent of world construction. Of 66 vessels built, 29 were large stern freezer trawlers for Soviet buyers. One was a mothership of over 10,000 tons. The others were side trawlers mostly for East German fleets, and a few for export.

In mid-1967, the East Germans had orders for fishery vessels totaling 170,000 gross tons. Most will go to the Soviets: 102 large stern freezer trawlers of "Atlantik" class are on order with Stralsund Shipyards for Sudimport of Moscow. Some will go to Iceland, Sweden, Denmark, and Tanzania (Zanzibar). The rapidly increasing construction rate has made possible expansion into fisheries of Southwest and Southeast Atlantic and Georges Bank.

#### Forced to Expand

Because of their dependence on only 2 major fisheries (North Atlantic herring and cod), the East Germans were forced to look for more fishing areas when stocks of those species declined in 1966 and 1967. This decrease soon showed up in their catches. Despite new vessels, the total East German catch in 1966 was 3.7 percent less than in 1965. Data for 1967 have not yet been published, but the total catch for the first 5 months was below the planned quota. In early 1967, ice and bad weather made the Labrador winter cod season a failure. Fishing off Newfoundland in late spring 1967 also proved poor, so the best solution for the East Germans was to keep moving south. They did--and ended on Georges Bank in mid-summer. A few vessels went to the southwestern Atlantic using Havana as a base.



### Denmark

#### DEVALUATION PRODUCES MIXED BAG

On Nov. 19, 1967, Denmark devalued its kroner by 7.9 percent. The immediate effect

## Denmark (Contd.):

was that fishery exports became cheaper in terms of nondevalued currency. The action was expected to permit profitable operations without granting the subsidies fishermen wanted. But now some trade circles are concerned that the advantages may be short-lived and the gains reduced by serious losses.

Since Denmark devalued less than the United Kingdom (U.K.) and Iceland, her competitive position with them was weakened. Moreover, materials and supplies imported from countries that did not devalue became more expensive. Shipping costs also became more costly.

## Sales to U. K. Hurt

Because the United Kingdom devalued by 14.3 percent, Danish sales to U. K. are being affected adversely. Also, most fishery products (except frozen fillets) exported to, or landed in, Britain must pay a 10-percent duty. Together, these factors make trading prohibitive unless Danish fishermen reduce prices further.

Iceland's greater devaluation will gain her certain advantages in U. K. Accordingly, Denmark's exports to U. K. may be expected to decline.

## Sales to U. S. Helped

Sales to the U. S. will be strengthened by devaluation. Most sales by Denmark, Greenland, and the Faroe Islands are made in terms of dollars. Devaluation makes the product cheaper to produce in the Danish economy. Lower prices of fishery products also should assist exports to West Germany, one of Denmark's major markets, and to other Common Market countries.

## Faroes Optimistic

The Faroe Islands expect their position to be improved for exports of salted and dried fish to Italy and Greece. They hope to win back markets in Brazil, which were lost several years ago to Norway. Exports to Spain and to U. K. will be affected adversely. However, Iceland's greater devaluation may help her in some of those markets and in Latin America and in Africa.

## Pressures to Help Fishermen

It is likely that devaluation will lead to increased pressures on the Danish Parliament to enact subsidy legislation for fisheries. The products fishermen must buy in foreign countries may be expected to rise at least 8 percent. Danish products from local raw materials are not expected to rise substantially, except when necessary to compensate for higher priced imports used in producing them.

Imports of frozen salmon from the U. S. and Canada will cost consumers more as a result of devaluation; this could reduce sales. Danish firms must spend more kroner to buy the dollars necessary to pay for frozen salmon. (U. S. Embassy, Copenhagen, Jan. 12, 1968.)

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## FY 1967 LOANS BY ROYAL DANISH FISHERIES BANK NEAR US\$4 MILLION

The Royal Danish Fisheries Bank processed 212 loan applications in fiscal 1967--Apr. 1, 1966-Mar. 31, 1967. It made 168 loans for US\$3.9 million. Most loans (82) were to buy new vessels; loans for new motors (41) were the next most numerous.

When a loan is approved, the fisherman receives bonds for the amount of the loan, and he must sell them to receive his funds. Bonds issued in fiscal 1967 carried either 6 or 7 percent interest. For fiscal 1968, there will be an increase in the legal limit under which the bank operates--from 150 million kroner (US\$21.8 million) to 200 million kr. (US\$29 million). The increased limit ends on March 31, 1968. In FY1968, borrowers will also bear the administrative expenses of operating the bank. (U. S. Embassy, Copenhagen, Dec. 8, 1967.)

\* \* \*

## VACUUM-DRIED SHRIMP MEAL USED IN TROUT FEED

The flavor and pink flesh color of trout reared in Danish ponds are now being enhanced by feeding the fish vacuum-dried meal made from shrimp processing waste. Experiments at the pond trout research laboratory at Brøns have shown that feeding



## Denmark (Contd.):

fresh raw shrimp waste improves flesh color in pond trout; experiments in feeding common shrimp meal dried at high temperatures, however, showed no such improvement. Scientifically controlled feeding tests of vacuum-dried shrimp meal have not been conducted at Brøns, but pond trout farmers are convinced of the value of vacuum-dried meal in trout feed. Flesh color improvement through vacuum-dried meal varies somewhat, but flavor improvement is considered a complete success.

## The Product

The company producing vacuum-dried meal from shrimp waste has had its drying plant in operation for about 18 months. The product is described as having remarkably good color and quality. The plant is said to get about a 50-percent higher price per kilo for vacuum-dried meal than Norwegian suppliers are paid for common shrimp meal processed at higher temperatures.

Another firm uses the vacuum-dried meal in trout feed produced under license from a U. S. company. Amounts of common shrimp meal are also used in feed formulation because adequate supplies of vacuum-dried meal have not been available. Most feed producers consider about 15 percent shrimp meal essential in pond trout formulations.

## The Plant

Vacuum-dried shrimp meal from Greenland will be transported to Denmark for sale to firms producing trout feed. The cost of the vacuum-drying plant, excluding building and steam boiler, is estimated at 750,000 Danish kroner (about US\$100,000). The electric power requirement for the plant is about 120 horsepower, and steam consumption will be about two tons per hour. Although it can also be used for drying waste from fish-filleting operations, the unit contains no defatting equipment and, therefore, would not be usable for such fatty fish as herring. Both the Greenland and Saeby plants were designed by the consulting engineer firm of E. H. Mathiesen, Generatorvej 45, Herlev, Denmark. (Regional Fisheries Attaché, U. S. Embassy Copenhagen, Dec. 22, 1967.)

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## LARGEST FISH MEAL PLANT TO EXPAND

Denmark's largest fish meal plant will be expanded during 1968 at a cost of US\$430,000 to handle increased catches of industrial fish from the North Sea. The larger catches have resulted from more intensive fishing and a general increase in size of vessels. If the plant is not enlarged, the fishing cooperative will have to place catch restrictions on its members. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Jan. 5, 1968.)

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SHIPBUILDING ACTIVITY  
RISES IN FAROE ISLANDS

Shipbuilding in the Faroe Islands has improved because the Danish National Bank will purchase at full par value the interest obligations for vessel loans made by the Faroese Government. Two stern trawlers (US\$1 million each) are now being built, and another valued at US\$1.4 million is on order from a Germany shipyard. All 3 have about 2,200-hp. engines. (U. S. Embassy, Copenhagen, Dec. 1, 1967.)

\* \* \*

## AIDS THAILAND

Over a 5-year period, Denmark will contribute equipment and instruments worth three million kroner (US\$400,000) to a marine biological station to be established in Thailand. Denmark will send 2 marine biologists and an assistant to start the station's research program. Any Thais who wish to be educated as marine biologists will be welcome. Thailand will make buildings available for the station.

The new station will be built at Phuket in south Thailand as part of that country's plans to extend her fisheries throughout the Bay of Thailand and beyond to the South China Sea and Indian Ocean. ("Vestkysten," Nov. 21, 1967; Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Nov. 24, 1967.)





## Iceland

### THE 1967 CATCH

Iceland's herring catch through Dec. 2, 1967, was 42.7 percent below comparable 1966 figures. The herring catch to date totaled 1967--393,000 tons; 1966--686,000 tons. Export value has dropped 50 percent, reflecting the decline in fish catch and world price.

Herring is the principal element in Iceland's catch each year and the principal fish foreign-exchange earner.

Of the 393,000 tons, 40,000 tons (297,000 barrels) were salted. This is 8,600 tons (63,000 barrels) short of the 360,000 barrels contracted for in advance foreign sales earlier in the year.

### Groundfish Situation Better Than Herring

Though the groundfish picture was less bleak than the herring, it still showed a 15.2 percent decrease in quantity. Groundfish (cod is the principal one) are generally caught between January and May. The 1966 season produced 207,000 tons; the 1967 catch fell to 175,000 tons.

### Smaller Fleet

In 1967, the number of fishing vessels declined: 166 boats fished herring (200 in 1966); 22 trawlers fished groundfish (28 in 1966).

At the end of October 1966, the trawler catch was 52,000 tons; the comparable 1967 figure was 64,000 tons. The catch since October has been very poor, however, so the 12-month 1967 total may be lower than 1966.

### Fishermen's Income Drops

Fishermen too have suffered. In 1966, the average share of the catch per man was 173,000 kronur (US\$3,035 at new rate of exchange US\$1 = 57 IKr.). (U. S. Embassy, Reykjavik, Dec. 14, 1967.)

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### AIDS FISHING INDUSTRY AFTER CURRENCY DEVALUATION

One Icelandic Government measure adopted following devaluation provides for payment in

local currency of all 1967 export proceeds to exporters at the exchange rate prevailing before devaluation (Nov. 19, 1967). This applies to payments for exports contracted before the end of 1967. The Treasury was to retain the differential between old and new rates of exchange.

On Dec. 18, 1967, a government bill was passed allocating to fishing industry these Treasury-retained "devaluation gains." The bill provides that the gains be used to pay certain costs and compensations to various fisheries sectors; the remainder is to be used to establish a price equalization fund for all exported fisheries products.

### Where Gains To Be Used

Part of the devaluation gains is to be applied first to subsidies to stock fish producers; subsidies to herring reduction factories for reduction of herring caught off North and East coasts in fall 1967; compensation for price falls on frozen shrimp processed in 1967; increased production costs of fisheries during remainder of 1967 due to devaluation; and miscellaneous subsidies.

Remaining funds may be used up to 25 percent to pay insurance premiums of vessels; up to 25 percent to Fisheries Fund and State Guarantee Fund for reorganization of fisheries and to increase productivity; up to 25 percent to a special exchange equalization fund within the Fisheries Fund for loans to meet devaluation losses on foreign debts sustained by fishing-vessel owners; the remaining funds are for the Price Equalization Fund.

### New Equalization Fund

The new Fund is an expansion of the 1967 Equalization Fund that compensated for export price declines only on frozen white fish. The new Fund coverage is broadened to compensate for export price declines of all exported fisheries products. Moreover, the Fund's purpose is to equalize effects of world price fluctuations on domestic industry by using proceeds accruing in times of high prices to offset losses when price fall. (U.S. Embassy, Reykjavik, Dec. 21, 1967.)

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Iceland (Contd.):

EXPORTS OF FISHERY PRODUCTS,  
JAN.-SEPT. 1966-67

The Icelandic "Statistical Bulletin," Nov. 1967, contains these export figures:

Product	Jan.-Sept. 1967			Jan.-Sept. 1966		
	Qty.	Value (f.o.b.)		Qty.	Value (f.o.b.)	
	Metric Tons	1,000 Kr.	US\$ 1,000	Metric Tons	1,000 Kr.	US\$ 1,000
Salted herring . . . . .	11,049	140,181	3,284	18,928	247,621	5,765
Other salted fish . . . .	18,878	383,084	8,454	23,773	457,557	10,653
Stockfish . . . . .	2,586	96,112	2,238	4,744	158,549	3,691
Herring, frozen . . . . .	11,807	74,165	1,727	13,757	89,140	2,075
Fish fillets, frozen . . . .	28,810	631,986	14,714	30,359	799,768	18,621
Shrimp & lobster, frozen . .	774	104,710	2,438	975	140,553	3,272
Fish and whale oil . . . .	63,268	372,034	8,662	64,668	522,065	12,155
Fish meal . . . . .	98,086	619,020	14,413	114,994	863,375	20,102
Other . . . . .	60,469	562,038	13,085	53,313	693,075	16,139
Total exports . . . . .	295,727	2,963,330	68,995	325,513	3,971,703	92,473

Note: Values converted at rate of 42.95 kroner equal US\$1.00.



## Ireland

## ISSUES FISH-HANDLING REGULATIONS

The Irish Government made public its regulations on fish handling as the latest step in its efforts to modernize the fisheries and to move into world markets. The "Demersal Fish (Handling, Storage and Transport) Regulations 1967" will enter into force on July 1, 1968.

The regulations relate to whole demersal (bottom-dwelling) fish or pieces intended for human consumption. Procedures for handling, storing, and transporting such fish

from capture until they reach the consumer are included. There are sections on cleanliness of fishing vessels, handling of fish at sea; grading, boxing, and icing; transport and distribution; cold storage and sale, and enforcement procedures. ("The Irish Skipper," Dec. 1967.)

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## NEW FISH MEAL PLANT

A new company plans to build a fish-meal plant on Ireland's West Cork coast, the most modern in the world. The plant will cost about £275,000 (US\$660,000) and handle up to 250 tons fish a day.

Reportedly, there are Irish and Norwegian principals. The site has been selected. Everything is ready to go--if negotiations between the owners and government departments end satisfactorily.

The new plant is planned to employ about 25 people and to keep 15 to 20 vessels and 100 fishermen working year round.

## Fish and Modern Techniques Available

It is hoped that the plant will be operating in about a year. Mackerel, herring, pilchard, sprat, and sand eels are believed available in sufficient quantities around the area. Fishermen are now using more modern techniques for catching, including midwater trawls. ("Fishing News," Dec. 29, 1967.)



## UNSINKABLE SUIT FROM USSR

A fisherman's unsinkable suit made of waterproof fabric has been designed in the Soviet Union. The suit is provided with an automatic device which supplies air into special cavities of the suit, making it buoyant. In case of a mishap the fisherman can stay afloat for an indefinite time, and the rescue teams can easily find him during the day by the bright orange color of his suit. At night a miniature electric beacon is switched on. ("World Fishing.")

## LATIN AMERICA

### Central American Fishery Development Commission Meets

Delegations from Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, and Panama met in San Jose, Costa Rica, on Nov. 28-30, 1967, for the second regular meeting of the FAO-sponsored Fishery Development Commission. International organizations and scientific groups were represented. The main agenda items were the Commission's annual report, the carrying out of the first working plan for a fisheries development project, the fisheries situation in member countries, juridical status of the Commission, and nomination of an administrator. The main issues discussed were use of fish taken incidental to shrimp fishing, and marketing studies of Central American fishery products. With special reference to Honduras and Nicaragua, the participants discussed the nationalization of fishing fleets operating within territorial waters.

#### Move to Guarantee Commission's Status

A 90-day timetable was set to prepare a statement guaranteeing permanent status to the Commission. This would be presented to member governments for approval. It was agreed to recommend that member countries eliminate port fees for research vessels of the development project.

The next regular meeting will be in Honduras, either in Tegucigalpa or La Ceiba, in about one year. The date will be decided by the Commission President. ("Boletin Informativo," Proyecto Regional de Desarrollo Pesquero en Centroamerica, Dec. 15, 1967.)



### Armour and United Fruit Plan Shrimp Culture

The Armour and United Fruit Companies together have hired a field consultant to experiment in shrimp raising in Central America. Current plans are to conduct normal shrimp trawling to get production underway while experimenting with shrimp culture techniques. The companies also are thinking

about clam culture on Mexico's west coast. (Regional Fisheries Attache, U. S. Embassy, Mexico, Dec. 26, 1967.)



## Mexico

### MEXICAN-JAPANESE SHRIMP CULTURE PLAN DROPPED

Plans announced in June 1967 for a Mexican-Japanese shrimp-farming venture on Mexico's Pacific coast apparently have been cancelled. The reason probably was the recent takeover of the west coast shrimp industry by BANFOCO (National Bank for Development of Cooperatives).

The plan called for shrimp raising in a stretch of the Sinaloa-Nayarit coastline between the Santiago and Presidio Rivers. With its lagoons, canals, and estuaries, it was thought this area could do without artificial ponds, controlled temperatures, and costly feeding--and rely on natural nutrients. (Regional Fisheries Attache, U. S. Embassy, Mexico, Dec. 26, 1967.)



## Ecuador

### SEEKS FRENCH AID FOR FISHERIES DEVELOPMENT

The Ecuadorean Embassy in France reported that Ecuador would seek agreements with France during 1968 to develop the Ecuadorean export industries. (Radio-Quito, Dec. 27, 1967.)



## British Honduras

### GRANTS DEVELOPMENT INCENTIVE TO NEW PLANT

The Government of British Honduras has issued a Development Incentive Order for Belize Marine Products Ltd. The enterprise will be a refrigerating plant for storage and freezing of "scale" fish for export. No fish other than scale fish may be used. The Company's vessels must operate outside British

### British Honduras (Contd.):

Honduran waters. All scale fish offered for sale by local fishermen must be bought within the capacity of the plant.

### Expansion After 4 Years

After 4 years, the enterprise shall be extended to include either a tuna and scrapfish canning plant, or a plant producing fish protein concentrate. The company's tax holiday extends from March 20, 1967, to March 21, 1978. Date of production is one year from date of development incentive order. (U. S. Consul, Belize City, Dec. 21, 1967.)



### Chile

#### NORTHERN FISHING INDUSTRY REORGANIZED DRASTICALLY

The Chilean Government has forced the northern Chile debt-plagued fishing industry to face economic reality. Recent government grants of advantages and subsidies to integrated companies have forced readjustment, with these results: (1) elimination of one-half the anchovy fleet and one-third the fish meal plants, (2) consolidation under leadership of the strongest companies, (3) diversification by adding to fish meal facilities freezing and canning facilities, and (4) near-nationalization by the Corporacion de Fomento de Produccion (CORFO), Chile's development and finance corporation.

#### What CORFO Will Do

CORFO will loan US\$10-15 million to integrated companies to pay off old debts. It will guarantee payments to creditors. This is a move calculated to restore confidence in Chile's business image. Even debts of near-bankrupt companies not planning to open will be paid. Of 28 fish-meal producers in Arica and Iquique, 6 integrated companies will survive. Each will have 2 or 3 plants strung along the coast, with a total capacity of at least 120 tons per hour. Maximum combined output annually should not exceed 200,000 tons of fish meal. Only 130-150 of the 300 available vessels will fish. Only integrated companies will be eligible for CORFO benefits. Bonuses up to 30 percent of f.o.b. value of exported value are still available for integrated plants, but now it is at President's discretion to decide whether independent companies can get a bonus. It seems all independent fishing companies will disappear.

### Arica and Iquique Affected

Ten plants in Arica and Iquique (all modern but two) will be closed. These include the Industrias Pfizer del Mar, a 60-ton-per-hour Standard Steel plant with a 4-stage stickwater concentration. The firm belongs to Pfizer International of New York. Some closed plants probably will be sold by CORFO to fishing companies in central and south Chile. Some purse seiners will be converted to trawlers and sold abroad. ("Ocean Fisheries," Jan. 1968.)

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#### FISH MEAL AND OIL PRODUCTION DROPS IN 11-MONTH PERIOD

These are the latest available data for North Chile's anchovy catch, fish meal and oil production, Jan.-Nov. 1967:

	1967	1966	1965
	..... (Metric Tons) .....		
<b>Anchovy Catch:</b>			
November.....	31,165	9,602	8,978
Jan.-Nov. ....	605,900	1,029,824	319,037
<b>Fish Meal Production:</b>			
January.....	15,983	333,504	12,836
February.....	20,294	27,113	11,371
March.....	7,794	15,536	10,278
April.....	1,651	14,067	3,587
May.....	3,447	26,754	4,090
June.....	16,487	18,783	2,989
July.....	13,331	17,865	2,188
August.....	6,054	17,978	3,651
September.....	11,656	11,696	794
October.....	11,408	2,687	888
November.....	6,554	1,887	1,453
Jan.-Nov. Total ...	114,659	187,870	54,125
<b>Fish Oil Production:</b>			
November.....	601	304	136
Jan.-Nov. ....	8,580	18,706	7,234

In November 1967, 28 percent (1,898 metric tons) of the anchoveta were landed in Arica, and 72 percent (4,656 tons) in Iquique. In Arica, 4 plants operated an average 9 days and produced 1,898 tons of meal; in Iquique, 10 plants worked an average 15 days and produced 4,656 tons of meal.

In addition to anchovy meal, November's production of other fish meal was 4,555 tons produced in Mejillones, San Antonio, and Talcahuano. In November 1966, production was 2,189 tons. During Jan.-Nov. 1967, production of fish meal other than anchovy was 34,876 tons, compared with 28,689 tons for the 1966 period. (Instituto de Fomento Pesquero, Informe Mensual No. 11, Nov. 1967.)





## ASIA

### Japan

#### MORE PEOPLE EAT FROZEN FISH

Frozen fish are steadily becoming more important in Japan. Between 35-50 percent of Japan's fish production--which in 1966 reached record of over 7 million metric tons--is being marketed frozen. Growing consumer acceptance of frozen fishery products is due to quality improvement of frozen fish, and the establishment of a low-temperature distribution chain.

After World War II, when landings in coastal and offshore waters began declining, fishery operators started to develop fishing grounds in more distant waters to meet growing domestic demand. This resulted in construction of larger vessels equipped with mechanical refrigeration. To overcome consumer resistance to frozen products, improvement in "freshness" of fish became a critical requirement.

#### Refrigeration Improved

As refrigeration technology advanced, particularly in the last 2-3 years, it became possible to quick-freeze catches aboard vessels at temperatures below  $-40^{\circ}\text{C}$ . ( $-40^{\circ}\text{F}$ .) This improved keeping quality markedly and increased food value. Fishery operators followed the idea that "the lower the freezing temperature, the higher the fish price." They began to install in newly built and remodeled vessels modern freezing plants capable of lowering freezing point to below  $-40^{\circ}\text{C}$ . The advantage of storage at such low temperatures was amply demonstrated in late 1967 when bluefin tuna brought back from the South Pacific off New Zealand sold for over US\$2,520 a short ton exvessel.

#### Fish Fresh Despite Long Trip

Along with improved shipboard refrigeration, the Japanese began to build large 5,000-10,000-ton capacity cold storages on land to store tuna and other fish at temperatures below  $-40^{\circ}\text{C}$ .

A new era has arrived. Consumers now can be supplied with highly fresh fish taken in distant waters--such as the Atlantic-caught "Monko" squid and the South Pacific bluefin

tuna--which often are in much better condition than local catches brought in by slow-moving iced-fish vessels. ("Suisan Keizai Shimbun," Jan. 1, 1968, and other sources.)

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### BERING SEA WINTER

#### TRAWL FISHERY UNDERWAY

Four Japanese mothership fleets will trawl in the eastern Bering Sea this winter. Nichiro Fishing Co.'s "Meisei Maru" (9,356 gross tons) departed Japan in late November 1967 for the Bering Sea, where she will be joined by about eight 499-ton trawlers. Taiyo-owned "Soyo Maru" (11,192 gross tons), which departed Yokohama Dec. 5, began fishing from Dec. 15 with 7 catcher vessels; she will be joined by 2 more vessels.

The "Soyo Maru" fleet will fish primarily for Alaska pollock for use in producing minced meat. The third fleet, led by Kokusai Gyogyo's "Seifu Maru" (8,333 gross tons), departed Yokohama Dec. 20, 1967, with 10 catcher vessels; she will operate until March 1968. The fourth fleet--the "Kashima Maru" and 8 trawlers--which terminated hake fishing in the Pacific Northwest around Dec. 8, was scheduled to arrive in the eastern Bering Sea in late December. The fleet will bottom trawl until the end of February 1968. ("Suisan Tsushin," Dec. 19, 21, 26, 1967.)

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### PACIFIC HAKE FISHERY CUT AGAIN

The Japanese factoryship "Kashima Maru," 7,163 gross tons, and 8 trawlers, which began fishing in the Pacific off Vancouver Island from Oct. 20, 1967, stopped around Dec. 8 because of stormy weather. The Kashima Maru fleet was the second group to begin hake fishing in the eastern North Pacific. It was scheduled to operate until the end of February 1968, with a catch target of 40,500 metric tons of bottomfish. Rough sea conditions and a poor catch of only 2,000 tons compelled the early withdrawal.

Owners Lose US\$833,000

It is reported that Nihon Suisan, owners of the fleet, lost over US\$833,000. The Kashima Maru was scheduled to proceed to the Bering Sea to trawl until the end of February 1968.



## Japan (Contd.):

("Shin Suisan Shimbun Sokuho," Dec. 21, 1967, and other sources.)

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TANNER CRAB FISHING  
WILL BE RESTRICTED

The Japanese Fisheries Agency plans to establish gear and vessel restrictions on the tanner crab fishery in the Bering Sea and Okhotsk Sea. The purpose is to prevent vessels from incidentally taking king crab in treaty areas of the northern waters.

The tanner crab fishery presently is not controlled. It was developed 2 years ago by Taiyo and Nihon Suisan. Because of growing market value in Japan, over 20 trawling firms reportedly plan to enter that fishery in 1968. ("Suisan Keizai Shimbun," Dec. 21, 1967, and other sources.)

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UN BUYS CANNED MACKEREL  
FOR RELIEF FEEDING

The UN Food and Agriculture Organization (FAO) ordered 4,195 cases (48-1 lb.) of canned mackerel from Japan under its program to combat the world food shortage. The order, handled by the Japan Canned Sardine and Mackerel Sales Company, was scheduled to be shipped from Kobe by Dec. 27, 1967. The shipment will meet emergency food needs in Tanzania. ("Suisancho Nippo," Nov. 18, 1967.)

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## ANTARCTIC WHALERS AT WORK

Four Japanese whaling fleets are participating in the 22nd (1967/68) Antarctic Whaling Expedition that began Dec. 12, 1967. The International Whaling Commission (IWC) as-

signed to Japan a national quota of 1,493 blue-whale units (BWU) for the expedition, a decrease of 140 units from the previous season.

The 2 other active whaling nations, the USSR and Norway, were assigned national quotas of 971 and 731 BWU, respectively. The IWC set an overall catch quota of 3,200 BWU for 1967/68, 300 BWU below 1966/67. ("Suisan Keizai Shimbun," Nov. 6, 1967.)

\* \* \*

NEW LONG-LINE LURE  
CATCHES MORE FISH

A new lure called "Korin" (corona), developed and patented by Ebisu Fishing Gear Manufacturing Co. of Yaizu, Japan, achieved remarkable results in recent long-line test fishing. The lure throws off 7 colors of the spectrum. It is attached to an ordinary bait fish as an attractant.

Test fishing was conducted off Ogasawa Islands in the Pacific Ocean south of Japan by the long-liner "Koei Maru No. 10," 39 gross tons; 2,000 hooks were used, each baited with saury. Half the hooks also were equipped with lures.

## Lure Helped Score 50% Higher

Results showed that the hooks baited with saury alone took 36 fish and those with lures 50--an increase of 54 percent in hook rate. Later sets produced similar results. The catch consisted predominantly of albacore but included also sizable quantities of yellowfin and bigeye tuna.

The lure costs about 4 U. S. cents. It can be used for 10 days of fishing. The vessel's fishing captain claims it will pay for itself. He hopes to test it on the next trip with other baits. ("Katuso-maguro Tsushin," Jan. 8, 1968.)

\* \* \*

1967/68 Antarctic Whaling Fleet

Company	Name of Fleet	No. Catcher Vessels	Catch Target 1967/68	Actual Catch 1966/67	Increase or Decrease
			..... (Blue-Whale Units) .....		
Taiyo	"Nisshin Maru"	9	403	348.5	+ 54.5
"	"Nisshin Maru No. 3"	9	240	354.5	-114.5
Nihon Suisan	"Tonan Maru No. 2"	12	425	465	- 40
Kyolayyo Hoge	"Kyolayyo Maru No. 3"	11	425	465	- 40

## Japan (Contd.):

## REPORT ON FISH MEAL AND OIL

Japanese consumption of fats and oils continues to rise. The final figure for 1967 was expected to reach 1,240,000 metric tons, 9 percent above 1966. Use for food may increase about 10 percent from 1966. Industry use will increase slightly.

The continuation of trends of recent years--expanding economy, higher consumer spending, changes in food habits--accounts for most of the increase.

Production of whale oil and sperm oil continues to decline and reduce Japanese exports. Production of fish oil is expected to increase because of higher 1967 catches; therefore, imports of fish oil will be very small.

1966 and 1967 Estimates, 1968 Forecast			
	1966	1967	1968
.. (1,000 Metric Tons) ..			
<b>Fish Meal:</b>			
Production . . . . .	347.0	350.0	350.0
Opening stocks . . . . .	1/	1/	-
Imports:			
Year's total . . . . .	95.6	75.0	90.0
January-July total . . . . .	60.7	44.6	-
Exports:			
Year's total . . . . .	15.8	90.0	50.0
January-July total . . . . .	8.8	57.3	-
<b>Edible Marine Oil:</b>			
<b>Fish Liver Oil:</b>			
Production . . . . .	7.3	7.5	7.5
Opening stocks . . . . .	1/	1/	-
Exports:			
Year's total . . . . .	0.5	2.0	2.0
January-July total . . . . .	0.1	1.4	-
<b>Fish Oil:</b>			
Production . . . . .	22.6	30.0	35.0
Opening stocks . . . . .	10.7	13.5	10.0
<b>Whale Oil:</b>			
Production . . . . .	55.3	50.0	42.5
Opening stocks . . . . .	7.7	6.3	7.0
Exports:			
Year's total . . . . .	37.8	35.0	27.0
January-July total . . . . .	32.5	30.1	-
<b>Inedible Marine Oil:</b>			
<b>Sperm Oil:</b>			
Production . . . . .	33.3	29.0	27.0
Opening stocks . . . . .	7.1	6.0	6.0
Exports:			
Year's total . . . . .	16.7	10.0	6.0
January-July total . . . . .	4.6	0.1	-
1/Not available.			

Relatively low hog prices and outbreaks of Newcastle disease, which adversely affected poultry population increases in early 1967, dampened rate of increase in feed consumption and, in turn, requirements for meal. (Agricultural Attaché, U. S. Embassy, Tokyo, Nov. 28, 1967.)

\* \* \*

## SHRIMP FISHING OFF SOUTH AMERICA PROGRESSES SLOWLY

In May 1967, seven Japanese fishing firms were licensed by the Fisheries Agency to operate experimentally 35 shrimp trawlers in the Caribbean Sea off northeast South America. So far, 16 trawlers have been placed in operation. It is reported that full-scale fishing may not begin until March 1968. Operations are being directed toward adjusting fishing gear and selecting fishing methods best suited to that area. Since most Japanese vessel operators are unfamiliar with the shrimp-fishing grounds off the Guianas, they are likely to have much trouble in the beginning.

In addition to the 35 newly licensed vessels, 15 other Japanese shrimpers are operating in the Caribbean Sea out of South American bases. ("Suisan Tsushin," Dec. 15, 1967, and other sources.)

\* \* \*

## 2.4 MILLION CASES OF CANNED TUNA IN BRINE SET FOR U. S.

About 2.4 million standard cases of canned tuna in brine for export to the U.S. were contracted for sale to Japanese trading firms during April-November 1967. About 1.8 million cases were whitemeat tuna, and 575,000 cases light meat tuna. Sales reportedly slowed sharply since October, when the Japan Tuna Packers Association raised canned tuna prices.

Kind of Pack	April-Nov. 1967 Sales By		
	Sales Company	Outside Packers <sup>1/</sup>	Total
	..... (Standard Cases <sup>2/</sup> ) .....		
Whitemeat . . . . .	1,737,661	995,844	1,833,505
Lightmeat . . . . .	508,344	66,704	575,048
Total . . . . .	2,246,005	162,548	2,408,553
1/Not members of Export Tuna Packers Association.			
2/Standard case--48 1/2-lb. cans.			

Japanese trading firms, preparing for the 1968 Lenten season, foresee considerable difficulty in selling the product. They anticipate a massive Lenten sales campaign by major U. S. tuna packers, primarily to move holdings of chunk-style lightmeat tuna. ("Suisan Tsushin," Dec. 4, 1967.)

\* \* \*

## TUNA EXPORTS DROPPED SHARPLY IN APRIL-NOVEMBER 1967

Japanese fresh and frozen tuna validated for export during April-November 1967 totaled

## Japan (Contd.):

76,193 metric tons, a decline of over 50,000 tons from comparable 1966 exports, according to the Japan Frozen Foods Exporters Association. Exports to the U. S. and Canada were particularly affected--declining over 30,000 tons from the 1966 period.

Species	U.S./Canada	Overseas Base	Other Countries	Total
	... (Short Ton) ...		.. (Metric Ton) ..	
Albacore. . .	24,353	7,939	196	29,491
Yellowfin . .	17,224	1,421	17,561	34,478
Big-eye . . .	402	704	3,675	4,680
Skipjack . . .	2,688	44	2,309	4,787
Bluefin . . .	-	3	564	567
Tuna loins . .	2,257	-	142	2,190
Total . . .	46,924	10,111	24,447	76,193
Apr.-Nov. 1966				
Total . . . .	78,325	18,569	39,662	127,565

Albacore was down 12,493 tons and yellowfin 12,130 tons. Loin exports to the U. S. were 2,357 tons, far below the 3,953 tons for comparable 1966. Frozen tuna exports to European and other countries declined 15,000 metric tons, of which 8,000 tons were yellowfin exports. Albacore shipments plummeted to 196 metric tons from 3,145 exported during the 1966 period. ("Suisan Tsushin," Dec. 20, 1967.)

\* \* \*

## TUNA SEINING GOOD IN SOUTH PACIFIC

The Kinkai Hoge Whaling Co.'s purse seiner "Nissho Maru," 253 gross tons, has found excellent fishing off New Guinea between 7° N.-8° N. latitudes. The vessel left Japan Nov. 10, 1967, for the South Pacific and began fishing about Nov. 22. As of Nov. 28, she had landed close to 70 metric tons of yellowfin (44- to 66-pound fish) and skipjack, and was expected to fill her holds in one more set. A carrier was sent to take the vessel's catch.

## New Net Used

This operation has drawn much attention in Japan because 2 years ago another Japanese seiner fished the same area with disappointing results. The recent success is attributed to a new purse seine developed jointly by Taito Seimo Net Manufacturing Co. and the Tokai Regional Fisheries Research Laboratory at a cost of US\$22,222.

Because of the rapid current and the deep thermocline in the western equatorial Pacific, the net was built with a larger mesh in the upper section to reduce resistance to the current flow. It was designed for faster sinking to prevent the escape of fish from under the net during setting. ("Shin Suisan Shimbun," Dec. 4, 1967, and other sources.)

\* \* \*

## NEW VESSEL TO SEINE TUNA IN EASTERN PACIFIC

The new Japanese purse seiner "Hakuryu Maru No. 55," 499 gross tons, departed Japan in mid-December 1967 for the eastern Pacific to fish for tuna about 6 months enroute to the Atlantic Ocean. It was built in September 1967 for the fishing firm Kawajiri Gyogyo.

The seiner is scheduled to operate off the California coast until March 1968, seeking bluefin and yellowfin tuna, and then will move southward off Mexico and Central America. Around June, when yellowfin fishing in the Atlantic begins to improve, the vessel will head for the eastern Atlantic to join the Japanese purse-seine fleet off West Africa.

## The No. 55

The "Hakuryu Maru No. 55" is equipped with brine freezing system. To prevent rust and corrosion, the walls in the fish hold are covered with reinforced plastic. Specifications: overall length--48.15 meters (158 feet); width--9.8 meters (32 feet); draft--4.8 meters (16 feet); daily freezing capacity--maximum 96.6 tons, normal 60 tons; fish hold dimensions--approx. 500 square meters (5,380 square feet). ("Suisan Keizai Shim-bun," Dec. 11, 1967.)

\* \* \*

## SEINE TUNA IN SOUTHWEST PACIFIC

Four Japanese purse seiners were scheduled to depart Japan in December 1967 for the South Pacific tuna fishing grounds: "Hayabusa Maru" (180 gross tons), "Nissho Maru" (253 gross tons), "Taikei Maru No. 23" (240 gross tons), and "Tokiwa Maru No. 58" (430 gross tons).

The seiners will operate in the South Pacific Ocean from Guam to waters east of New

## Japan (Contd.):

Zealand, fishing skipjack and yellowfin tuna. Two other purse seiners licensed for South Pacific experimental operation are not participating at this time.

In late 1966, purse seiners, including the "Taikei Maru No. 23," which is equipped with 2 power blocks, fished for skipjack off Guam with disappointing results. ("Shin Suisan Shimbun Sokuho," Nov. 16, 1967.)

\*\*\*

1967 YAIZU FISH LANDINGS DOWN  
BUT VALUE UP

During 1967, landings at Yaizu, the largest fishing port in Japan, totaled 160,000 metric tons valued at \$65.5 million--down 6 percent in quantity but up 4 percent in value from 1966. ("Suisancho Nippo," Jan. 10, 1968, and other sources.)

Product	1967		1966	
	Qty.	Value	Qty.	Value
	Metric Ton	US\$1,000	Metric Ton	US\$1,000
<b>Tuna:</b>				
Bluefin <sup>1</sup> . . .	59,438	37,644	64,038	35,303
Albacore . . .	26,121	11,566	21,117	10,079
Skipjack . . .	44,259	11,443	56,762	13,125
Mackerel . . .	21,551	2,286	18,494	1,837
Others . . .	8,633	2,590	8,621	2,472
<b>Total . . .</b>	<b>160,002</b>	<b>65,529</b>	<b>169,032</b>	<b>62,816</b>

<sup>1</sup>/Includes yellowfin and big-eyed tuna.

\*\*\*

## FISHERY BUDGET IS UP FOR 1968

On Jan. 12, 1968, the Japanese Government completed its fiscal year 1968 (April 1968-March 1969) budget estimates for submission to the National Diet (parliament). Requests for the Fisheries Agency total about US\$78.95 million--6.2 percent over the FY 1967 budget of US\$74.36 million.

The FY 1968 budget shows a notable increase in funds for the fishing ground development program. A total of \$1.59 million has been requested, compared with \$230,000 appropriated in FY 1967. New projects proposed under this program include exploratory work relating to distant-water purse-seining, tuna long-lining, and trawling.

FY 1968 Japanese Fishery Budget

Program	Proposed FY 1968 Budget	Actual FY 1967 Budget
. (In Millions of US\$) .		
Fishery technological improvement . . .	3.79	3.55
Fishing industry disaster compensation system . . . . .	1.95	1.45
Artificial reef construction . . . . .	1.63	1.59
Distant-water fishing ground development . . . . .	1.59	0.23
Marine resources conservation and development . . . . .	1.48	1.39
International fisheries biological research . . . . .	0.51	0.49
Shallow-water fishing ground development . . . . .	0.05	0
Other . . . . .	67.95	65.66
<b>Total . . . . .</b>	<b>78.95</b>	<b>74.36</b>

Another new item in the FY 1968 budget is whale tagging off the coast of Japan. This was proposed under the biological research program for international fisheries. New too is money to install automatic-relay water pollution detection devices in 12 places, and automatic-recording detection devices in 25 places throughout Japan. This is under the Agency's program relating to fishery resource conservation and development. Also, a new \$56,000 shallow-water fishery development program has been funded to conduct an engineering survey in Matsushima and Hamanako Bays. ("Suisan Keizai Shimbun," Jan. 15, 1968.)

日本

## Taiwan

## U. S. FIRM INVESTS IN FISHERIES

A Los Angeles firm has invested US\$225,000 to form the Pao Hua Marine Products Co. Local Taiwanese participation will be US\$525,000. The new company will employ about 200 persons (180 on high seas, 18 in home office) and will fish for tuna in the Pacific, Indian, and Atlantic Oceans.

The estimated annual catch of 3,300 metric tons (worth about US\$1.6 million) will be exported to Europe, Japan, and the U. S. The new company's fleet will operate an undetermined number of tuna fishing vessels serviced by a 3,268-ton refrigerated fish carrier. (U. S. Embassy, Taipei, Jan. 12, 1968.)





## South Vietnam

### UN AIDS FISHERIES DEVELOPMENT

Under an agreement concluded in Saigon in October 1967, the United Nations will assist South Vietnam in exploratory and experimental fishing operations in offshore waters. Also the commercial feasibility of introducing modern craft and fishing methods, and marketing problems and prospects for sales of increased landings, will be studied. Apart from rice, fish is considered the most important item in South Vietnamese programs to increase food production.

#### Largest FAO Fisheries Program

The fisheries program is one of the UN's major activities in South Vietnam and the largest of almost 30 current FAO fishery projects. The project will be spread over four years, cost an estimated US\$4.2 million, and be administered by the UN's Food and Agriculture Organization. Nearly half (US\$2 million) of the total operating fund will be provided by the U. S. under its foreign aid program. ("The Saigon Post," Oct. 21, 1967, and other sources.)



## Communist China

### EXTENDS FISHERY AGREEMENT WITH JAPAN

On Dec. 20, 1967, the Chinese unilaterally extended the 1955 Private Fisheries Agreement on the Conservation of Fishery Resources and Safe Fishing Operations in the Yellow and East China Seas. This had been concluded by the Japanese Fisheries Council and China's Fisheries Association.

The agreement has a stormy past. It was suspended in 1958 after "flag incident" at Nagasaki and resumed in 1963. For several months preceding Dec. 20, 1967, it appeared the Chinese had no intention of renewing it. This would have been a severe blow to Japanese fishing: over 700 vessels take more than 300,000 metric tons of fish annually in the area covered by the agreement. After the

1958 suspension, the Japanese vessels were picked up wholesale by the Chinese.

#### Political Drama

Complications began in August 1967, when a Japanese Fisheries Delegation about to visit Mainland China was suddenly told by the Chinese to stay home. Japan-China relations were strained by the announced visits of Prime Minister Sato to Nationalist China (Taiwan) and South Vietnam. Alarmed, the Japanese Fisheries Council consulted its Government, then sent a telegram to Mainland China probing her intentions. There was no reply. A second message on November 24 also went unanswered. Expecting the worst, the Council tried to induce the Japanese Government to change its policy towards Communist China--but failed.

The Chinese notice of the agreement's extension for 1 year was received favorably by Japan's Fisheries Agency Director (Hisamune), the Taiyo Fisheries Co. President (Nakabe), and other influential persons. Nakabe pressed for additional steps by Japan to better relations with Mainland China (long-term trade agreement).



## South Korea

### BERING SEA TRAWL FLEET RETURNS

The South Korean fleet, which operated in the Bering Sea and off Alaska for about 3 months, returned to Pusan in mid-November 1967. The fleet, consisting of the mother-ship "Sam Su No. 301" (957-gross-ton refrigerated carrier) and ten 100-ton trawlers, was sent to the Bering Sea by the Sam Yang Fishing Co.

Two of the vessels sank in heavy winds off Alaska with a loss of 18 lives.

The landings were only a few metric tons of North Pacific bottomfishes; the rest was eaten by the crew on the return trip.





## SOUTH PACIFIC

### American Samoa

#### TAIWAN TO START TUNA SALES COMPANY

Taiwan is reported planning to establish on American Samoa a sales company financed jointly by the Taiwanese Government and the fishing industry. At present, Taiwan operates over 80 tuna vessels out of Samoa.

Tuna landings of the Samoa-based Taiwanese fleet now are sold through the Japanese Taiyo Fishing Co. and the Formosan Marine Products. The proposed company would take over sales and supply procurement for the fleet. ("Suisancho Nippo," Nov. 4, 1967.)

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#### TUNA PRICE DROPS IN JANUARY 1968

On Jan. 9, 1968, Japanese tuna suppliers and U. S. packers in American Samoa agreed to hold January 1968 tuna delivery prices at the December 1967 levels. During the negotiations, the Japanese initially sought a \$5-a-ton increase for yellowfin. They were offered a \$5 drop by U. S. packers. Later, they accepted the American offer to continue the December 1967 prices.

In 1967, the Samoa tuna delivery prices continued to decline until May. Then they began to rise gradually but did not reach the levels of a year earlier.

	January	
	1968	1967
	. (US\$/Short Ton) .	
<b>Albacore:</b>		
Frozen. . . . .	372.50	390
Iced. . . . .	357	375
<b>Yellowfin:</b>		
Frozen. . . . .	310	350
Iced. . . . .	290	330
<b>Big-eyed:</b>		
Frozen. . . . .	185	240
Iced. . . . .	170	225

The January 1968 prices are \$17.50 below January 1967 prices for albacore, \$40 below for yellowfin, and \$55 for big-eyed. ("Suisan Tsushin," Jan. 11, 1968.)



### Fiji Islands

#### NEW FISHERY RESEARCH VESSEL LAUNCHED

A fisheries research vessel for the Fiji Government, named "Gonedau" (Fishermen), was launched recently. The vessel, built by the Fiji Public Works Department, will carry out research and experiment with fishing methods in Fiji waters. ("Pacific Islands Monthly," Oct. 1967.)



## AFRICA

### Senegal

#### 1967/68 TUNA SEASON STARTS WELL

The tuna fishing season in Senegal began on Nov. 1, 1967, and the outlook for a good year is favorable. As a result of continued fishing during the offseason, May 15-October 30, this year's tuna season started well. The 5 freezer vessels owned by the Government's Societe Senegalaise d'Armement a la Peche (SOSAP)--and 3 small Basque vessels--caught an estimated 2,500 tons of tuna before this year's season officially started. So Senegal's 3 tuna canneries already have processed over 4,000 tons of tuna. It seems likely that Senegal will be able to fill its export quota to France for the first time since 1961.

#### African Nations Set Quotas

The Interstate Committee for Tuna (representatives of France, Ivory Coast, Malagasy, Mauritania, Congo-Brazzaville, and Senegal) held its annual conference in Paris, Nov. 15, 1967, and fixed quotas for tuna imports into France for the 1967/68 season. Senegal's quota was 10,300 tons, down 700 tons from 1966/67. However, the quota allotment will be reviewed again in March 1968 and may be raised if warranted.

The Committee also raised the price paid fishermen by 5 CFA francs per kg. The price of yellowfin (over 3 kg. size) was set at 87.5 CFA francs per kg. (36 U. S. cents), and skipjack (over 2.5 kg. size) at 60 CFA francs per kg. (24 U. S. cents). Also, Senegal agreed to allow 39 French vessels to participate in Senegal's tuna campaign if they landed their entire catch in Dakar.

#### Hope Seasonal Aspect Will End

The favorable offseason catch has given hope that the industry's seasonal aspect eventually will be eliminated. Next year's offseason plans call for fishing by 8 Basque vessels in addition to the 5 SOSAP vessels in operation. One tuna cannery (probably the smallest) will continue to operate, thus eliminating the great expense of freezing tuna until the regular season begins.

Progress also has been made in the projected expansion of SOSAP's tuna fleet. A source in the Fonds d'Aide et de Cooperation (FAC) has indicated that the financing problems for French tuna boats on order for SOSAP have finally been resolved. Accordingly, it is hoped that some of these vessels, as well as some Soviet-built vessels, will be delivered in time to participate in next year's season. (U. S. Embassy, Jan. 1, 1968.)



### OYSTERS ARE A HISTORICAL DELICACY

History tells us the Roman emperors had fresh oysters transported to their banquets packed in bags of snow, and Pliny says that as early as 95 B.C., one Sergius Orata became the first man to cultivate oysters by growing them on the bottom of Lake Lucrinus. Roman writers such as Horace, Seneca, and Cicero praised the virtues and flavor of oysters. When the Romans invaded England they settled near oyster producing areas.

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## MUSKELLUNGE USED TO CONTROL FISH POPULATIONS

Muskellunge, which are described as a voracious and violent northern game fish, have been introduced into Pomme de Terre Lake in Missouri by that State's Conservation Department. Biologists said 51,000 tiny muskies were released into the lake with the hope they will help control the populations of carp and shad and keep fish populations in better balance. The inch-long muskies were raised from eggs obtained in Pennsylvania and Michigan. About 1,000 will be kept in an attempt to raise brood stock for future experimental work and 8,000 more will be released at Pomme de Terre at a larger size.



Muskellunge

Muskies eat a lot of carp and shad and there are more of these species in the lake than the bass population can handle. An inch-long muskellunge can eat 10 minnows a day. If he can't find a minnow, he will eat another muskellunge.

The violent nature of the muskie is normally exhibited only to other fish. Man appreciates this side of the muskie's character only when he and the fish are at opposite ends of a fishing line. There have been anglers who preferred not to boat a muskie after a long battle unless they first left the boat. The fact that muskellunge can reach weights of more than 100 pounds may explain some of this reluctance to tangle with them on a man-to-fish basis. The current record for rod and reel is 69 pounds, 15 ounces, but the record by any method stands at 102 pounds. (All Outdoors, Missouri Conservation Commission.)

Created in 1849, the Department of the Interior—America's Department of Natural Resources—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

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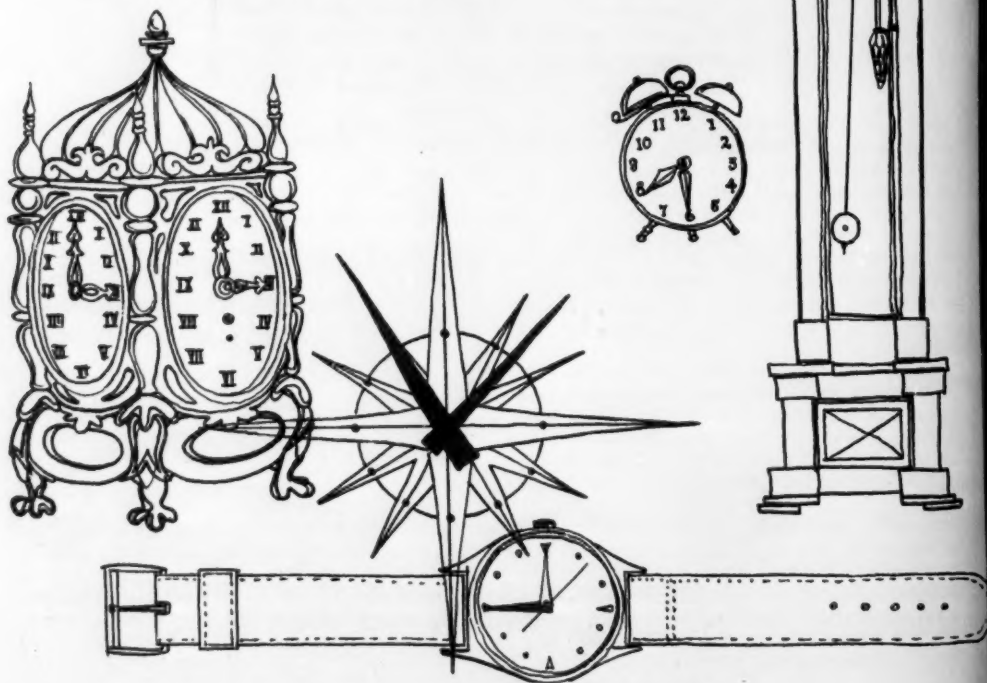
# Time For Seafood

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